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Composition and Printing by the Imperial Printing Office.

The type of this catalogue has been cast in the Imperial Printing Office from designs by GEORG SCHILLER. It has been used both for the English and German editions.

Paper supplied by Messrs. J. W. ZANDERS' paper mills, at Bergisch-Gladbach in Rhenania, Prussia.

Printing inks supplied by the factory of Wesses. KAST & EHINGER, Ltd., Stuttgart.

Material for cover from Messrs. CARL SIMON SONS, Kirn-on-the-Nahe.

Binding by Messrs. HÜBEL & DENCK, Leipsic.

English translation by Mr. G. E. MABERLY-OPPLER, Charlottenburg.

INTERNATIONAL EXPOSITION ST. LOUIS 1904

OFFICIAL CATALOGUE OF THE EXHIBITION OF THE GERMAN EMPIRE

EDITED BY THE IMPERIAL COMMISSIONER

PUBLISHED BY GEORG STILKE, BERLIN



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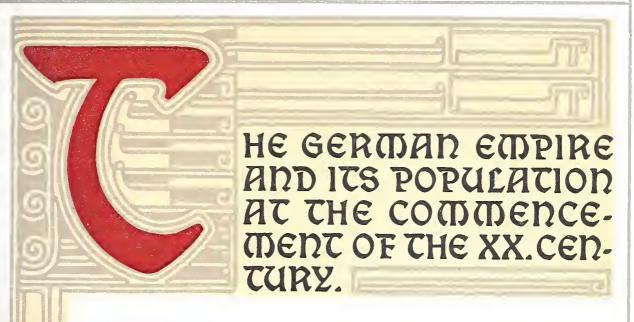
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A century and a year have passed since the dissolution of the ancient Holy Roman Empire of the German nation was formally announced at Regensburg on the 25th of February 1803 by the Reichsdeputationshauptschluss. The Holy Roman Empire of Charlemagne, a thousand years old, had led only an imaginary existence during the two preceding centuries. From among the hundreds of its territorial lords, two powers had gradually come to the front. The long period of war after 1793 had resulted in the disappearance of the majority of its petty States. The form adopted at the Vienna Congress in 1815, for the 39 remaining States, the so-called "Deutsche Bund" with a Federal Diet at Frankfort, was, by lack of authority, but little suited for changing Germany into anything more than a "geographical idea."

Economical development on an extensive scale was first rendered possible, by the social-political combination of large territories, which took place on the 1st of January 1834 in the form of the German "Zollverein" (Customs Union). According to Treitschke, even then it took Germany till the end of the fourth decade of the 19th century to regain the height of prosperity she had occupied among the other nations before the outbreak of the Thirty Years War.

Scarcely had a generation passed, when the economical unification was followed by the struggle for a political combination into a uniformly administered State.

A smaller territory, but with an organisation stronger than ever before, the new German Empire, foreshadowed by the "Nord-deutsche Bund" (North German Consederation) of 1867, was created on the 18th January 1871. The free will and action of its princes and citizens called into life a Federal State, at the head of which three emperors, William the Great, Frederic III. and William II., have

stood, since its foundation, as the embodiment of the greatness and honour of their country, and as the guardians and preservers of universal peace. The results of these political events have proved blessings to all classes of the nation, and many of the disadvantages caused by the dissension which formerly prevailed were rectified under the new Empire by its first generation of citizens.

1. Territory.

The territory of the German Empire, exclusive of those parts (such as Haffs, Boddens, &c.,) which are covered by water, embraces an area of 540,742.6 sq.-kms which is divided as follows: Prussia 348,658 sq.-kms (64.5 per cent), Bavaria 75,870 sq.-kms (14 per cent), Saxony 14,993 sq.-kms (2.8 per cent), Würtemberg 19,513 sq.-kms (3.6 per cent), Baden 15,081 sq.-kms (2.8 per cent), Alsace-Lorraine 14,513 sq.-kms (2.7 per cent), Mecklenburg-Schwerin 13,127 sq.-kms (2.4 per cent), and the remaining 19 States 38,988 sq.-kms (7.2 per cent).

Colonial Germany beyond the seas, however, covers an area five times as large, viz., 2,656,915 sq.-kms, made up as follows: in Africa: German East Africa 995,000 sq.-kms, The Cameroons 495,000 sq.-kms, Togoland 87,200 sq.-kms, German South West Africa 833,100 sq.-kms, South Seas: German New Guinea 239,000 sq.-kms, the Caroline, Pelew and Marianne Islands 2,176 sq.-kms, the Marshall Islands 415 sq.-kms, Samoa 2,572 sq.-kms; East Asia: Kiao Chao (on lease) 552 sq.-kms, and in addition a sphere of influence 7,650 sq.-kms in extent, embracing 50 kms around Kiao Chao.

ll. Population.

Population of to-day.

The population of the Empire according to the census of December 1st, 1900, numbers 56,367,178 persons*). An Estimate made on the strength of the registers of

births, deaths, immigration and emigration, returns the numbers for the middle of 1901 at 56.7 millions, 1902 at 57.7 millions, 1903 at 58.5 millions. The numbers contributed by the larger Federal States in 1900 were as follows: Prussia 34.5 millions (61.2 per cent), Bavaria 6.2 millions (11 per cent), Saxony 4.2 millions (7.4 per cent), Würtemberg 2.2 millions (3.9 per cent), Baden 1.9 millions (3.3 per cent), Alsace-Lorraine 1.7 millions (3 per cent), Hesse 1.1 millions (2 per cent), and the remaining 19 States 4.6 millions (8.2 per cent).

Increase of Population.

Since 1816 the population of the area covered by the Empire has developed as follows: at the end of 1816 24.8 millions, 1850 35.4 millions, 1871 41.1 millions,

^{*)} These figures are exclusive of persons on board German ships outside the German Empire, the white population in the German protectorates, and the German expedition in China, in all 97,000 persons.

1890 49.4 millions, 1895 52.3 millions, 1900 56.4 millions. The growth expressed in percentage has been as follows: 1816—1900 total 126.9 per cent, yearly average 0.98 per cent; 1871—1900 total 37.3 per cent, yearly average 1.10 per cent; 1890—1900 total 14.1 per cent, yearly average 1.32 per cent; 1895—1900*) 7.82 per cent, yearly average 1.52 per cent.

The increase in the population shown by the last Census is actually and relatively the largest ever noted for the whole Empire. In certain parts of the country, however, a comparatively larger growth has repeatedly occured. Whilst during the period 1816-1855 the eastern parts of the Empire showed the greatest increase (attaining in Pomerania a maximum of 1.64 per cent, per annum), during the period 1855-1900, it was principally the North Western Industrial neighbourhoods (the towns excluded) which showed a considerable increase in their population, a maximum of 1.65 per cent being reached in Westphalia. In the Southern States the increase in the population has been constantly below the average for the whole Empire (Bavaria 0.64 per cent, Würtemberg 0.51 per cent, Alsace-Lorraine 0.35 per cent). Prussia with 1.10 per cent, stood a little above the average, and the kingdom of Saxony, with 1.51 per cent, considerably above. The relative growth of the population since 1871 in some of the important divisions of the country is shown in the following table:

		per cent -1900	Increase per cent 1890-1900		
	total yearly average		total	yearly average	
Prussia	39.6	1.15	15.1	1.40	
City of Berlin	128.6	2.89	19.6	1.78	
Ruhr Coal District .	222.8**)	4·12**)	61.2	4.88	
Gumbinnen	6.7	0.22	0.7	0.07	
Bavaria	27.0	0.83	10.4	0.99	
Saxony	64-4	1.73	19-9	1.82	
Würtemberg	19-3	0.61	6.6	0.62	
Baden	27.8	0.85	12.7	1.20	
Alsace-Lorraine	11.0	0.36	7.3	0.69	

Density of population, that is to say the number of persons dwelling on every sq.-km of the country's area, has undergone a corresponding change. In the present territory of the whole Empire and of the four kingdoms, the figures are as follows:

^{*)} According to the estimates referred to, the increase for 1900/03 amounted to a yearly average of 1.48.

^{**)} The district of Mülheim (Ruhr), which was not independent in 1871, is not included in these figures.

	Density of population per sqkm					
	1816	1855	1871	1890	1900	
German Empire	45.9	66.8	75.9	91.5	104.2	
Prussia	39.3	61-1	70-7	86.0	98-9	
Bavaria	47.5	59.4	64.1	73.7	81.4	
Saxony	79.6	136.0	170.5	233.6	280.3	
Würtemberg	72.3	85.6	93.2	104.4	111.2	

The population is strikingly thin in the country districts north of a line drawn between Hanover and Breslau, with the exception of the surroundings of a few great cities such as Berlin, Hamburg, Bremen and Danzig. The districts south of this line are particularly densely inhabited, with the exception of large portions of Bavaria to the east of the Rhine, and the intermediate mountain districts between the Weser, Ems and Main, the Swabian Jura and the Eifel. The population of small villages and towns is most dense in parts of Silesia and the Province of Saxony, in the Kingdom of Saxony and also along the Rhine and its principal tributaries, particularly the middle Meckar, the lower Main and, above all, in Rhenish-Westphalia, all of these districts being decidedly industrial ones. The Baltic Höhenrücken, Mecklenburg, parts of the province of Brandenburg, the heath of Lüneburg, the district of the middle Ems as well as the southern districts already mentioned, are on the contrary very sparsely populated.



Division of the population according to age and sex. In Germany, on an average, about 106 boys are born to every 100 girls; the mortality however, among the former is so much higher, that they only remain in a majority until they reach the age of 21. Amongst those

who attain a greater age, the female sex preponderates in an increasing scale, there being 122 women to every 100 men over 60 years of age. In the year 1900, the total number of men was 27.7 million, the total number of women 28.6 million. Of the total population, 19.6 million (34.8 per cent) were children under 15 years of age, and 10.4 million (18.5 per cent) young people between 15 and 25. In the prime of life, between the ages of 25 and 40, there were 11.9 million persons (21 per cent), and between 40 and 60, 10.1 million [17.9 per cent]; of the remaining 4.4 million [7.8 per cent] fully 11/2 million [2.7 per cent] had already passed the biblical 70 years, and 269,000 [0.48] per cent) were over 80 years old. 8 men and 32 women could look back on a full century. The men whose age [18 to 45] rendered them liable for military service numbered 11 million. The classification into ages today, shows little variation from the figures noted since 1871. The proportion of children is almost exactly the same, whilst the division comprising children from 15 to 30 years shows a slight increase; the numbers between the ages 30 and 70 have decreased a little, while the numbers of quite old persons have augmented to a considerable extent.

90

Households.

The population of Germany in 1900 comprised 12.3 million households of an average of 4.6 members. Amongst them were 0.9 million households (7.1 per cent of the

total) which consisted of a single person, making 1.5 per cent of the population, 2/3 of them being women; 81,000 institutions of various kinds (0.7 per cent of the households) housed 2.9 per cent of the population—the remaining 95.6 per cent of the population were members of family households. In this last category nearly nine tenths belonged to the family, one-fortieth were household servants, and one-twelfth lodgers, boarders, industrial or agricultural servants. A tendency to increase amongst institutions and single households is clearly evident from the statistics since 1871.

9

Dwellings.

The 121/4 million households are divided amongst 6.2 million inhabited dwelling houses and 89,000 other buildings. The average number of persons dwelling in

each house is 8.9 the maximum (46.6 persons) occuring in Berlin.

The following are the figures for 1900

	Actual number millions	relative percentage	
Single	33,520	59.5	
Married Widowers	19,593 0,809	34.8	
Widows	2,353	5.6	
Divorced { males . }	0,031 0,061	0-16	

Approximately 3/5 (58.5 per cent) of persons of marriageable age, (over 18 years on the average—males over 20, females over 16) are married, and a further tenth (9.7 per cent) have been married. These statistics show a slight increase of married persons as compared to previous figures showing the best marriageable age amongst single, widowed or divorced persons.



Movements of the population.

The number of marriages contracted in the year 1900 was 476,000, viz. 8.5 per thousand of the population. With this number the average of the Seventies was

attained again. After the Franco-German war, the number of marriages increased in 1872 to 10·3 per thousand, but fell in a few years to 7·5 per thousand, after which it rose pretty regularly to the present figure. The birth rate, however, shows a considerable difference; for, reaching its highest point in 1876 with 42·6 per thousand, it continually decreased until in 1900 it fell as low as to 36·8 per thousand, and from an annual average of 40·7 per thousand during the period 1871-1880 to 37·4 per thousand for the period 1891-1900. These figures, however, do not give occasion any anxiety; for in consequence of economic progress and sanitary achievements the rate of mortality has fallen still lower, viz. from 28·8 per thousand during 1871-1880 to 23·5 per thousand during 1891-1900, so that the natural rate of increase in the population has

risen from 11.9 per thousand during the former period to 13.9 per thousand during the latter. In the years 1851-1860 it only amounted to 9 per thousand. This satisfactory philo-progenitiveness of the German race is not evident to the same extent in various districts. The annual average of the natural increase per thousand of the population from 1891-1900 was as follows: Prussia 14.9, (Westphalia 19.8, Posen 19.4, Rheinland 16.5, Berlin 9.7) Bavaria that part on the right bank of the Rhine 10.4, Bavarian Palatinate 16.0, Kingdom of Saxony 15.5, Würtemberg 10.9, Alsace-Lorraine 8.6. The annual average of illegitimate births occuring Illegitimacy and during the period 1851-1860 amounted to 11.5 of the total number of births; this percentage, however, dropped to an annual average of 9.1 per cent during 1890-1900. The number of still-born children also decreased to 3.1 per cent, although it had amounted to 4 per cent regularly before 1881. The population of Germany according to the last cen-Denominations. sus comprises 2 large groups of Evangelical Christians numbering 35.2 million persons (62.5 per cent) and a third group of Catholic Christians with 20.3 million (36.1 per cent); other Christian creeds claim 204,000 persons (0.4 per cent). The non-Christian

Ill. Nationality, Language and Emigration. Jo

There were 779,000 foreigners living in Germany in

all inhabitants of the German Empire was German. Nearly 1/2 per cent of the inhabitants had another

group includes 587,000 Jews (1.0 per cent) and 11,600 persons belonging to

other religions. 5,900 persons made no returns as to confession.

1900, a number exceeding 11/3 per cent of the actual Nationality. population. The number of persons born abroad was somewhat greater, and totalled 838,000, so that about 60,000 persons of foreign birth have become German subjects. In 1871 only 207,000 foreigners (1/2 per cent of the population) were noted. Of the foreigners in the census of 1900, 97-2 per cent belonged to European states. Of the remaining 21,500, the large majority (17,800) were citizens of the United States of America, some of them of German origin. Of the European foreigners, 391,000 persons (50 per cent of the total number of foreigners) were subjects of Austro-Hungary, 88,000 [11 per cent] were Dutch, 70,000 [9 per cent] Italian, 55,000 (7 per cent) Swiss, 47,000 (6 per cent) Russian, 27,000 (3.4 per cent) Danes, 20,000 (2.6 per cent) French, 16 000 (2 per cent) British or Irish. The greatest increase amongst these nations since 1880 is shown by the Italians, who have become nearly ten times as numerous, the Dutch 5 times as numerous, and subjects of the Austro-Hungary Monarchy and Russia, 3 times as numerous. The Danes on the other hand have decreased to 3/4 of their number in 1890. In the year 1900 the mother tongue of 92 per cent of

mother tonque besides German, the principle number (170,000) being Poles.

Native language.

41/2 million inhabitants acknowledged exclusively a non-German mother tongue, amongst them being 3,100,000 Poles, 212,000 French, 142,000 Masourians, 141,000 Danes and Norwegians, 106,000 Lithuanians, 100,000 Cassubians, 93,000 Wends, 80,000 Dutch, 66,000 Italians und 64,000 Moravians. The mother tongue of 22,400 persons was English, 2,200 of which—principally German-Americans—claiming equally German as their mother tongue.

The districts occupied by the Polish-speaking population are principally the provinces of West Prussia, Posen, Silesia; in the Rhenish-Westphalian industrial districts, however, a considerable increase of the Polish-speaking population has resulted from the great influx of Polish miners. In 1880 only 5.9 per cent of the population in the Recklinghausen district were Polish-speaking. In 1900 the percentage had risen to 13.8 per cent. The strong permeation of Alsace-Lorraine—at one time purely French—with the German element is worthy of note, for only 198,000 persons (forming a ninth part of the whole population), still speak exclusively French.

German subjects in foreign countries.

The number of Germans resident abroad, which the international statistics for 1890 returned at 3,500,000, is imcomparably greater than the number of foreigners

residing in the German Empire. In the interchange going on between the nations, therefore, the German Empire has hitherto lost considerably. After subtracting the gain resulting from immigration, the 60 years from 1841 to 1900 show a net loss by emigration of 4,790,000 persons, or a sixth of the natural increase in population of the German Empire. The rapid economic growth of the country has, however, resulted in there being a gain of 94,000 persons instead of a loss for the period 1895-1900.

The country which has benefited most from the influx of Germans is the United States of America, where the census for 1890 showed the presence of 2,700,000 inhabitants who were born in Germany. 6,200,000 or 8.2 per cent of the total population of the United States were the offspring of German parents, and 1.6 million were children of parents one of whom was born in Germany. There are no statistics relating to a great number of persons descended in the second generation from parents of German birth. Taking all in all, about one sixth of the population of the United States may be counted as having German blood in its veins. The next most important country, where persons of German birth or German nationality—the difference is not observed in the figures given by the various countries—are to be found, was, according to the statistics for 1890, Switzerland with 94,000; then came France with 84,000, Great Britain and Ireland with 54,000, British Australia with 50,000 and Brazil with 44,000.

German speaking population abroad.

The number of German-speaking persons in all the countries of the world taken together, is very much higher. Estimates recently made put the total number of per-

sons in the world who use German for their every-day speech at 82,000,000 of whom 70,000,000 were in Europe. Of this number 53,000,000 live in the German Empire, 11,000,000—rapidly decreasing in number—in the United States, 9,400,000 in Austria, 2,300,000 in Switzerland, 2,200,000 in Hungary,

2,000,000 in Russia, 600,000 in Central and South America, over 200,000 in Luxemburg, about 100,000 each in France, Belgium, Great Britain, Asia, Africa and Australia, and 50,000 each in Denmark, Holland, Italy and Roumania.

Emigration regarded as a whole.

This distribution of the German race over the whole earth, and its grouping together in special countries is—apart from territories bordering immediately upon

the present German Empire—essentially the result of the continuous movement which has made itself evident amongst Germans during the last few generations, particularly in the form of emigration to over-sea countries.

No statistics can be given concerning the emigration over the frontiers of the Empire; regarding the emigration of Germans to lands beyond the seas, the Imperial statistics return the number at 2,560,000 persons for the period 1871-1902. The total number of German emigrants to lands beyond the seas for the period 1820-1903 is estimated at 6,500,000, and the resulting loss of population at over 20 million.

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Development and present condition of emigration to countries beyond the seas.

According to the statistics of the Washington Immigration Office, over 5,000,000 Germans emigrated to the United States between 1821 and 1902; during the period 1871-1903 the United States was the goal of 2,500,000 Germans, or 95 per cent of the total number of German emigrants, while all the rest of

America only received about 100,000 Germans during the same period. The attempts made to induce German peasants to go to Brazil have had no success worthy of mention. The number of emigrants to that country rose, temporarly only, to 4,000 in 1890, but since 1896 not more than 1,000 per annum has been recorded. It is only due to the sudden decrease in German emigration as a whole, which commenced in 1894, that the figures for the proportion claimed by Brazil, Canada, Africa, &c., appear comparatively higher.

At the beginning of the eighties the annual number of emigrants amounted to over 200,000 persons,—from 41/2 to 5 per thousand of the population. In 1891 the number was 120,000, in 1901 only 22,000, in 1902 32,000. Of these 29,211 went to the United States, 807 to Brazil, 546 to other parts of America, 114 to Africa, 2 to Asia, and 235 to Australia. It must be pointed out here that, as a rule, only steerage passengers are counted as emigrants. If cabin-passengers were included in the number of emigrants, the figures would be very different, especially those for Asia, Africa and Australia.



Passengers from German ports. Four-fifths of the emigrants from Germany start from Bremen and Hamburg, the remainder principally from Antwerp and Rotterdam. Besides the German emi-

grants there are a large number of foreign emigrants—in 1902 221,000 in all, including 75,000 Austrians, 73,000 Russians and 69,000 Hungarians—who make their way to German ports in order to cross the ocean on German vessels.



Age and Sex of emigrants.

German emigrants in the year 1902 were divided according to age and sex as follows: fully two-fifths were females, and two-thirds of the total number of

emigrants were between the ages of 17 and 50. Of every 100,000 males between the ages of 21 and 30, 400 to 500 emigrated annually between 1871 and 1893, and over 300 in every 100,000 females between the same ages accompanied them. The proportion of emigrants of both sexes between these ages has, however, dropped to about 120 at the present day.

Emigration and movement of population within the country.

It is a characteristic feature of emigration from Germany that not the lowest but rather the better classes leave the country. Emigration is too expensive a matter for the very lowest classes on the one hand, and on the other it is never taken into serious

consideration by them. This class of the population is influenced much more by the other great movement which has lately fundamentally altered the distribution of population in the German Empire, viz. the movement of the population within the Empire itself from one part to another, and from the country to the cities, whereby a great tendency to move from the East to the West has made itself evident.



Migration in the East, West and

The effects of migration are clearly shown by the birth statistics of 1900. If foreigners are not taken South of the Empire. into account at all, and only the 55.5 million natives of Germany considered, we find that the following dis-

tricts in East Germany have gained through inland migration;—Brandenburg sincluding Berlin), Hamburg and Schleswig-Holstein (including Lübeck), 1.3 million inhabitants; in West Germany,-Bremen, Rheinland, Westphalia and the Kingdom of Saxony 0.9 million; in South Germany,—Baden and Alsace-Lorraine 0.2 million. The following districts have lost,—in the East—East and West Prussia, Posen, Silesia and both Mecklenburgs 1.7 million; in the West—the Province of Saxony with Brunswick and Anhalt, Thuringia, Hanover (with Lippe), Oldenburg, Hesse-Nassau (with Waldeck), 0.4 million. In the South-Bavaria, Würtemberg (with Hohenzollern), and Hesse, 0.2 million.

Figures showing the distribution of gains and losses in reference to inland migration are given below:

Districts which	Received (in thousands) from the					
gained in the-	East	West	South	total		
East West South	976 463 23	284 395 66	24 10 97	1,285 868 186		
Districts which	passed over (in thousands) to the					
lost in the—	East	West	South	total		
East	976 44 7	703 395 124	40 (gain) 48 97	1,719 392 228		

Digration within the country has, therefore, brought a gain of about half a million inhabitants to West Germany, principally from the east. Within East Germany, however, there is also a preponderating movement towards the west; for the districts which are gaining here are in the west, and those losing are in the east. The conditions in South and West Germany are almost the same. In view of these facts, the above figures give a statistical picture of the "westward movement."

The migration within the country, already shown in figures, partially explains the unusual increase in the population and comparative density found in these German States and districts which are more strongly developed in-

dustrially as compared with the markedly agricultural districts.

Influence of migration and natural increase upon the actual growth of the population.

The fact that the increase in the population has been below the average of the Empire in East Prussia and Posen since 1870, is principally due to losses caused by migration; in Bavaria, Würtemberg and Alsace-Lorraine, however, which are likewise loosing through interchange of population, the natural increase is a

relatively small one. Hamburg and Berlin draw their growing population principally from abroad, while the growth in the kingdom of Saxony as well as Rhineland and Westphalia, is to a large extent due to natural philo-progenitiveness. Since 1890 the situation has altered in so far that the excess of births over deaths has increased everywhere, with the exception of Würtemberg and Berlin, whilst emigration to foreign countries has considerably decreased, in fact has been replaced since 1895, as already pointed out, by a slight gain. Accordingly Alsace-Corraine, where the losses were due principally to emigration abroad (France), shows a considerably smaller loss. The increased movement towards the west is manifested in Rhineland and Westphalia, where the numbers gained through migration have been doubled; similarly, the greatest loss is shown in East Prussia. The influx into Berlin and Hamburg has fallen off by a half.

The unusually high gains in population due to migration experienced in the capital of the Empire and in the city State of Hamburg, are a result of the cause already mentioned, viz. the "Influx into towns". This has occasioned a fundamental change during the last generation in the relation between country an town population, as proved by the following figures:

	Country population (in places of less than 2,000 inhabitants)		Town population (in places of more than 2,000 inhabitants)		Number of places having	
	actual (in thousands)	percentage of total population	actual (in thousands)	percentage of total population	over 2,000 in- habitants	
1871	26,219	63-9	14,791	36-1	2,328	
1880	26,514	58.6	18,721	41.4	2,707	
1890	26,185	53-0	23,243	47.0	2,891	
1900	25,734	45.7	30,633	54.3	3,360	
	1					

so that whilst in 1871 nearly 67 per cent of the population of the German Empire lived in the rural districts, and 33 per cent in towns, today only 46 per cent live in the country, and 54 per cent in town communities. The actual loss of the rural population during the period 1871-1900 was half a million, whilst the towns gained almost 16 million, viz. more than the town population numbered altogether in 1871. The town population was divided in 1900 as follows:

	lnhabitants	Number	Population in thousands	Percentage of total population of the Empire
Country towns Small towns Middle sized towns Large towns	2,000- 4,999 5,000-19,999 20,000-99,999 100,000 and over	2,269 864 194 33	6,816 7,585 7,111 9,120	12·1 13·4 12·6 16·2
	Total	3,360	30,633	54.3

Among the large towns there were 14 with over 200,000 inhabitants, 7 with over 300,000, and 5 with over 400,000 inhabitants, viz.: Berlin 1,889,000, Hamburg 706,000, Munich 500,000, Leipsic 456,000, Breslau 423,000, Dresden 396,000, Cologne 373,000, Frankfort-on-the-M. 289,000, Nuremberg 261,000, Hanover 236,000, Magdeburg 230,000, Düsseldorf 214,000, Stettin 211,000, Chemnitz 207,000.

The above figures only give the population inhabiting the actual municipal area. If the large towns are taken together with the suburbs immediately adjoining them within a circle of 10 kms. from the centre of the town, according to a recently tabulated computation for 30 large towns, we arrive at the following figures:

	Total popu- lation (in thousands)	Actual number (in suburbs)	Per- centage
Greater Berlin	2,534	645	25.5
Hamburg	988	282	28.5
Essen	758	639	84.3
Dresden	634	238	37.6
Leipsic	566	110	19.5
Munich	526	26	5.0
Barmen-Elberfeld	519	220	42.4
Cologne	481	109	22.7
Breslau	475	52	11.0

	Total popu- lation (in thousands)	Actual number (in suburbs)	Per• centage
Frankfort-on-the-M	437	148	33.8
Hanover	339	104	30.5
Dortmund	338	195	57-7
Nuremberg	337	76	22.5
Düsseldorf	311	97	31.3
Chemnitz	305	98	32.1
Stuttgart	300	124	41.2

If the suburbs are included, the population of large towns in Germany has increased by almost a half. Whilst the number of inhabitants in the municipal area grew between 1871 and 1900 at the rate of 114.6 per cent, the total increase within the 10 km circle, was 141.5 per cent, i. e., the growth within the suburban area, was considerably greater than in the cities themselves.

Amongst the 9.1 million town inhabitants ascertained in 1900, 43.3 per cent were persons born in the towns themselves; in 1900, on the other hand, 1.4 million persons from these towns settled in other places. These large towns, owing to the preponderating influx of able-bodied adults, show a distribution of ages considerably more favourable from the standpoint of economic development than the remaining portions of the Empire.

IV. Classes and Occupation of the Community.

A. Occupation.

Development.

The development of the division of Germany into ranks according to profession or social position has been from the very first most closely connected with the changes

and varying aspects of the population, its movements and distribution. At the beginning of the nineteenth century Germany was sparsely inhabited by a population principally devoted to agriculture, and was only in a position to support a comparatively small number of inhabitants. Dieterici, in 1849, puts the agricultural population included in the German customs Union at 7/10ths of the whole, and the non-agricultural population at 3/10ths. At that time Germany raised at home not only sufficient agricultural products (with the exception of cotton), but also exported annually a considerable amount of her surplus produce. Soon, however, a change in the economic conditions of the country made itself evident. Wholesale industry grew to such an

extent that Germany took a leading place among the industrial nations of the world, and the increasing home population consequently consumed a higher proportion of the products of the earth. Industries for producing goods for export sprang up, whereas instead of exporting agricultural produces as formerly, she has now to import them.

Division according to occupation.

The transition from an industrial minority in the population to an industrial majority was completed in the last two decades of the past century, and is

reflected in the figures showing the numbers employed in these two divisions of labour in 1882 and 1895. Whilst in 1882 42.5 per cent of the 451/4 million inhabitants of the Empire still earned their livelihood by agriculture, 35.5 per cent by industrial pursuits, and 10 per cent by trade and commerce, the proportion of the population living by agriculture fell in 1895 to 35.7 per cent, whilst the manufacturing population rose to 39.1 per cent, and those living by trade and commerce to 11.5 per cent of the whole population. The following are the principal results of the two censuses:

🔳 Population divided according to occupation or trade in 1882 and 1895. 📺

						30-00
	18	95	18	82	Increase crease si	or de- nce 1882
	1,000 persons	per cent	1,000 persons	per cent	1,000 persons	per cent
l. Agriculture	18,501	35.7	19,225	42.5	- 724	- 3.8
tures and Building	20,253	39·1	16,058	35.5	+4,195	+ 26.1
Ill. Commerce and trade	5,967	11.5	4,531	10.0	+1,436	+ 31.7
IV. Domestic service and paid work of						
varying nature*) .	887	1.7	938	2·1	- 51	5.5
V. Army, civil service						
and free professions Army and navy, in-	2,835	5.5	2,223	4.9	+ 612	+ 27.5
cluded in the abore Ul. Without occupation	737	1.4	542	1.2	+ 194	+ 35.8
or no occupation stated	3,327	6.4	2,246	5.0	+1,081	+ 48·1
or of no occupation	7,490	13.6	5,407	12.0	+1,642	+ 30.4
Total population	51,770	100.0	45,222	100.0	+6548	+14.5

The total population therefore has increased by 14.5 per cent; the agricultural population on the other hand has decreased 3.8 per cent, while the number of persons employed in industries has risen 26.1 per cent, and the number of persons in business occupations 31.7 per cent.

^{*)} Persons receiving pay for domestic service (attendants, &c.) and labourers of varying occupation.

The population is divided according to occupation as follows:

	ln 1	895	ln 1	882		ase or ease
	thousand	percent-	thousand	percent-	thousand	percent-
	persons	age	persons	age	persons	age
Agriculture: As their main source of living Servants*)	8,293	44·8	8,236	42·8	+ 56	+ 0.7
	375	2·1	425	2·2	- 50	-11.8
	9,834	53·1	10,564	55·0	- 730	- 6.9
Mining, Industry and Building: As their main source of living Servants Family and dependents	8,281	40 [.] 8	6,396	39·8	+ 1,885	+ 29·5
	320	1 [.] 6	302	1·9	+ 18	+ 5·8
	11,652	57 [.] 6	9,359	58·3	+ 2,293	+ 24·5
Trade and Commerce: As their main source of living Servants Family and dependents	2,339	39·2	1,570	34·7	+ 786	+ 48·9
	284	4·8	295	6·5	- 11	- 3·9
	3,344	56·0	2,665	58·8	+ 679	+ 25·5
Other occupations and of no occupations: As their main source of living Servants	1,858 361 2,687	26·3 **) 5·1 38·2	302 2,322	26·4**) 5·5 43·0	+ 59 + 365	+ 30·1 + 19·6 + 15·9
pendent	2,143 20,771 1,339 27,517	30·4 40·1 2·6 53·2	1,354 17,632 1,325 24,911	39·0 2·9 55·1	+ 788 + 3,927 + 14 + 2,607	+ 58·2 + 20·7 + 1·1 + 10·5
Without occupation and inde- pendent	2,143	4·1	1,354	3.0	+ 788	+ 58.2

Population earning their living.

The above table shows that in 1895, 2/5ths of the population of Germany were earning their living by an occupation or trade. The numbers of domestic servants,

which make up another fortieth of the population, are separated from those earning a living by a trade or profession, because their occupation, like that of the house-wife, is entirely devoted to household matters, and consequently counts directly with the household from the private stand-point, but not from the political economist's point of view. There is also a further matter to be taken into account, viz. that, in ascertaining the proportion of the total population which is earning its living, that part of the population—likewise

^{*)} Servants living in the house employed in household duties and not in industrial pursuits.

^{**)} These low figures are explained by the fact that those of no occupation do not come under the heading "Earning their living" but under the separate heading without occupation."

forming 2/5ths of the whole—which is below the age of 14 or above that of 60, and which is naturally less capable of earning a living, is not reckoned separately. If this is considered, and the numbers are divided into sexes, the following result is obtained:

Persons between the ages of 14 and 60:

1		Total number in thousands	Number by thousands	Earning living occupations per cent	
	Males Females	15,158 15,770	14,141 4,768	93·3 30·2	
	Total	30,928	18,909	61.2	

Of the population of an age able to earn its own living 3/5ths are therefore actively engaged in doing so, that is, 9/10ths of the males and 3/10ths of the females.

Since the year 1882 the proportion of the total population earning its living has risen in all branches of occupation, but principally in trade and commerce, whilst the proportion of domestic servants has fallen. An increase of 800,000 (2/3rds of the total number) is returned in the division "without occupation and independent," a division made up of the most varied elements.*) Taken all in all, those earning a living by an occupation have increased by 1/5th (nearly 4 million), those under "Family" by 1/10th (21/2 million) and persons in domestic service by 1 per cent (14,000).



Change of occupation.

The falling off in number of those engaged in agri-Change of proportion in each 700,000 persons, is not so much derived from those actively engaged as from their servants and families.

On the contrary, the number of agricultural concerns and the area under cultivation has slightly increased (see below). Improved agricultural science and machinery, in reducing the amount of manual work have made it possible to dispense with a number of agricultural labourers. What has, however, had far more to do with the depopulation of the rural districts—a circumstance to be much regretted, both from the social and economic stand-points is the greater freedom and higher pay offered in towns and industrial districts. A far more favourable development is shown in the industry of the country as well as in trade and commerce, which have benefited by almost the whole increase in the population, viz. (86 per cent) since 1882. The number of

^{*)} To this class belong persons living on their own means, pensioners and those in receipt of financial support, those attending school, and students not living with their families, inmates of benevolent institutions, alms-houses, infirmaries, asylums, prisons and reformatories, as well as persons having no stated occupation, but all these provided they are not included elsewhere under "Family." The increase is principally from among persons of private means, pensioners, students and school children.

persons gaining their livelihood in industries has increased by 1,900,000, and their families by over 21/3 millions; the number of persons in domestic service only increased by 18,000. The numbers of those engaged in trade and commerce shows a growth of nearly 770,000, and their families and dependents of 680,000, while the number of servants decreased by fully 11,000. The relative increase has been similar in the remaining occupations, also the free professions and civil service, household servants and persons of varying occupation, together with those of no occupation. Taking the average of all occupations, those actually employed and earning their living have increased by 18 per cent, their families by half as much, viz., 1/10th, and their servants by 1 per cent. Persons of no occupation—including those who have a slight occupation of secondary importance—have become more than twice as numerous, showing an increase, without servants and families, of nearly 58 per cent.



Female workers.

The proportion of females, who work for their living, as far as has been ascertained up to 1895, is shown by the following table:

Occupations of females.

	1,000 persons		Perce	Increase or decrease in percentage	
	1895	1882	1895	1882	since 1882
Earning a living Domestic servants Families	5,264 1,314 18,667	4,259 1,282 16,828	20·5 5·0 70·8	18·5 5·6 72·9	+ 23.6 + 2.5 + 10.9
Without occupation and independent	1,116	702	4-2	3.0	+ 58.9
Total	26,361	23,071	100-0	100.0	+14.3

This shows that in 1895, 1/5th of all females or, including domestic servants, 1/4th (as compared with 3/5ths = 61 per cent of the males) were actively engaged in an occupation. This means an increase in female labour since 1882 of 23.6 per cent, as against 16 per cent among the males. In 1895, of a total of 18 million females above the age of 14, 29 per cent were earning their living, and a further 7 per cent were employed as domestic servants. These figures are certainly far behind those for the male population of the same age, where as many as 91 per cent are earning their living; nevertheless they show, that the proportion of females earning their own living already amounts to one third of the males.

Amongst the total number, therefore, of persons earning their own living in 1895, the proportion of males to females was 3 to 1, in agricultural pursuits 2 to 1; in the textile industry and clothing trade, however, the number

of females employed was but little behind that of the males, and in trade and commerce, where the males employed stood in the proportion of 4 to 1 to the females, the division "Hotels and refreshment rooms" shows a preponderance of females over males earning their living. Similarly in the division "Domestic service, &c." females are in the majority, whilst the public service and professions are only beginning gradually to become open to them.

So much for the general features which testify to the large and growing

output of work by the whole population.

Different classes of occupation.

Colour is lent to the picture by a glance into the volumes of Imperial statistics regarding occupations and professions, as many as 22 main groups of oc-

cupations being distinguished. (Statistics of the German Empire. New Edition,

vol. III, p. 30.)

In 1895 Agriculture stood at the head with over 2/5ths of all persons actively engaged in deriving their living from the production and sale of produce. Next came the clothing industry (with 8 per cent of those earning their living), then the building industry (with 7 per cent), commerce (with 6.4 per cent), the textile industry (with 5 per cent), the production of articles of food, metal working, carving and wood work, the carrying Trade, mining, smelting and salt works, &c. It must not be forgotten here that these figures are no criterion for the value and relative production of the various branches of industry, nor for their relative importance within the Empire.

Since the census of 1882 the insurance business has shown the greatest increase of persons earning their living (120 per cent); then come the chemical industry (79 per cent), the Hotel and Restaurant business (76 per cent), the polygraphic industry (71 per cent), metal working (63 per cent), quarrying

[51 per cent], the paper industry [50 per cent], &c.

Local distribution of occupations.

The geographical distribution of occupations confirms the fact, already suggested by the table of density of the population, that agriculture is the principal source

of work and livelihood of the population of Posen, East and West Prussia and Pomerania, and that it still forms the most general occupation of the population in Mecklenburg, Oldenburg, Bavaria, Würtemberg, Hanover, Baden, Alsace-Lorraine and Schleswig-Holstein, whilst in most of the remaining states and districts, industrial occupations predominate. This is particularly true of the Kingdom of Saxony, Westphalia and Rhineland, where more than half of the population depend upon industry for their living. Trade and commerce is most prominent in Sleswick-Holstein, the Kingdom of Saxony, Hesse-Nassau and Rhineland, where 1/7 to 1/8 of the population earn their livelihood thereby, whilst in Würtemberg, West Prussia the number is only 7 per cent.



Comparison of occupations in towns and in the country. The division of occupations in town and country is still more distinct than in the different districts of the country. The census of 1895 shows the following result:

Place of dwelling of persons earning their livelihood by occupations, and persons of no occupation and of independent persons:

	In the lar	ge towns	In other	towns	ln country	
	1,000 persons	per cent	1,000 persons	per cent	1,000 persons	per cent
Agriculture	45 1,608 775	1·4 49·4 23·8	1,078 5,708 1,850	11.8 49.4 14.4	7,215 2,573 488	62·9 22·4 4·3
labour	141 340 344	4·3 10·5 10·6	367 1,170 1,276	4·1 10·2 10·1	65 256 867	0·6 2·2 7·6
Total	3,253	100.0	11,449	100.0	11,464	100.0

A half of all those earning their livelihood in towns are employed in industries, 1/7th in trade and commerce (in the larger towns 1/4), and fully 1/10th in the civil service and free professions. In the country the industries are only half, and the civil service and free professions scarcely a quarter as strongly represented as in the towns.

The development in some of the larger towns is particularly striking. The following are prominently industrial: Barmen, where in 1895, 75 per cent of all persons earning a livelihood and in service came under the heading of those occupied in industry, then Crefeld with 67 per cent, Chemnitz with 67 per cent, Elberfeld with 66 per cent, Dortmund with 64 per cent. Nuremberg with 60 per cent, Düsseldorf with 57 per cent, Aix-la-Chapelle with 56 per cent, Brunswick with 54 per cent, Leipsic with 54 per cent, Berlin with 53 per cent, Breslau with 51 per cent, Cologne with 51 per cent, and Dresden with 50 per cent.

The most prominent commercial cities are Hamburg with 37 per cent, Stettin with 30 per cent, Bremen with 29 per cent, Altona with 29 per cent, Frankfort-on-the-Main with 28 per cent, Leipsic with 26 per cent, Magdeburg with 25 per cent, Halle-on-the-Saale with 25 per cent, Cologne with 24 per cent, Berlin with 24 per cent, and Munich with 24 per cent inhabitants earning a living by trade. Attention must here be again drawn to the fact that the economic importance of the out-puts of these cities is quite inadequately expressed by the figures showing the number of persons earning a livelihood in certain callings.

B. Social Divisions.

Social grades in the division of occupation.

The picture of the German population is completed in detail by a glance at its social division. In 1895, of the total 18.9 million persons earning a livelihood who are embraced in the three principal divisions of

occupation, industry trade and commerce, 28.9 per cent were their own

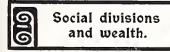
masters, 3.3 per cent employees—principally in commercial and technical establishments—and 67.8 per cent artisans. These were divided according to occupation as follows:

		Own ma	asters	Emplo	yees	Artis	ans	Number of employees and
	Year	1,000 per- sons	per cent	1,000 per- sons	per cent	1,000 per- sons	per cent	artisans to every 100 masters
Agriculture	1895	2,569	31·0	96	1·2	5,628	67·9	223
	1882	2,288	27·8	67	0·8	5,882	71·4	260
(Dining industries)	1895 1882	2,266 2,062 2,201	24·9 34·4	264 99	3·2 1·6	5,956 4,096	71·9 64·0	302 191
Trade and commerce	1895	844	36·1	262	11·2	1,233	52·7	177
	1882	702	44·7	142	9·0	727	46·3	124
Total	1895	5,474	28·9	622	3·3	12,817	67·8	245
	1882	5,191	32·0	307	1·9	10,705	66·1	212

The relatively largest number of persons conducting their own business (36 per cent) is shown under the head of Trade and Commerce, to which the largest number of employees (11 per cent) also belong. Socially, the artisan class is the one most strongly represented in the various industries, comprising as it does 72 per cent of all persons earning a livelihood. It is interesting to note the two diametrically opposed tendencies which have led to a not inconsiderable increase in the number of masters in the item Agriculture, and to a considerable relative decrease in their numbers in industry and trade in favour of subordinates (employees and artisans). The number of employees has risen throughout all the classes.

If those employed in the civil service, the professions, personal household domestics, hired labour of varying sorts, and if attendants and those of no occupation are also taken into consideration—which cannot, however, be done without causing a certain amount of distortion, since the division is socially dependent upon quite other factors than those applying to the three divisions of occupation—the following altered result is obtained:

	Own masters		€mpl	oyees	Artisans	
	1,000 persons	per- centage	1,000 persons	per- centage	1,000 persons	per- centage
Agriculture, industries, trade and commerce	5,474	28.9	622	3.3	12,817	67 [.] 8
Other occupations	460	14-4	196	6·1	2,542	79·5
Total	5,934	26.8	818	3.7	15,358	69·5



The value of this tabulation is increased when one looks more carefully into the great social differences among the class of those who carry on their own business. Including families and relations, the total population for 1895 may then be divided up as follows:

	1,000 persons	Percentage of the population	Percentage of the independent persons
Independent	23,013 646 15,875 6,492 28,757	44·4 1·3 30·7 12·5 55·6	100·0 2·8 69·0 28·2
Total	51,770	100-0	

Position of the middle class.

The middle class embraces one half of the population engaged in agricultural pursuits. On general economic considerations it appears possible as well as desir-

able to maintain and strengthen it in that direction. It also includes one seventh of the industrially active persons, and three-fourths of those in trade and business.

This latter class, however, is more and more changing its natural basis through the growth of largely capitalized shops and stores in the wholesale and retail trades. The greater part of the poorer class of independent persons really belong to the working class, and is mostly composed of small artisans and home-workers in the textile and clothing industries, whose conditions of existence leave a great deal to be desired.

Independent persons are comparatively most numerous various occupations. in the clothing and cleaning trades (56 per cent of all persons earning a livelihood and in service), in

commerce (48 per cent), in artistic professions (36 per cent), in the hotel and restaurant trade (36 per cent), in the wood trade (32 per cent) and in agriculture (31 per cent); they are most sparsely represented in the chemical industry (10 per cent), in quarrying, brickmaking, &c. (7 per cent), and most poorly of all in the mining and smelting industries (0.5 per cent) where large concerns are the rule. The greatest number of employees are to be found in the assurance business (66 per cent) and railway and traffic concerns

*) The middle class includes those, who, following agricultural pursuits, are possessors of farms of 2-100 hectares, or who, following industrial pursuits, trade or commerce, or having their own establishments in which collectively 2-20 persons are employed. The owners of larger establishments are accordingly relegated to the wealthy, and those of smaller establishments to the poorer class. From the independent class in all other occupations, 1/10th is taken for each of the wealthy and poorer classes, while 8/10 ths go to increase the middle class. At the same time, however, among persons of no stated occupation, only those are reckoned as independent who live upon their private capital, income, or pension.

(16 per cent), the smallest number in agriculture (0.96 per cent) and the hotel and restaurant business (0.49 per cent). The largest number of labourers are found in the mining and smelting industries (95 per cent), in quarrying, brickmaking, &c. (91 per cent), in the building trade (81 per cent) in the polygraphic trades (85 per cent), in the metal-working trade (81 per cent), and in the chemical industry (80 per cent); the fewest are found in commerce (40 per cent) and the assurance business (5.8 per cent).

In the majority of occupations and trades, a decrease in the number of masters and an increase in the number of hands took place, this being particularly noticeable in the textile industry, but also to be found in mechanical occupations such as those of potters, smiths, hat-makers, glasiers, brick makers and brewers.

The two sexes are differently divided in the three social classes; that is to say, of every hundred males and females earning a livelihood, we find:

	Own masters		€mp	loyees	Labourers	
	Males	Females	Males	Females	Males	Females
Agriculture lndustries Trade and commerce	40·1 22·8 36·4	12·6 34·2 35·0	1·4 3·8 14·2	0·7 0·6 2·1	58·5 73·4 49·4	86·7 65·2 63·0
Total As compared to 1882	31·3 34·2	22·0 25·4	4·1 2·4	0.3	64·5 63·4	77·2 74·3

In the labouring class, therefore, there are relatively a far greater number of females earning their living than males, whereas in the employee class there are but few to be found, although many more than formerly. In the industries, a third part of all females earning their living are independent workers (numerous home-workers in the textile and clothing industries being here included). In trade and commerce the proportion is a little higher still, viz., 35 per cent. In this branch of occupation as many ½50th of all females earning their living belong to the class of employees.

The following figures show the relative position held by females to males in the several social classes in general, and in the particular occupations which they prefer—viz. agriculture, the textile industry, the clothing and cleaning trade, commerce, and the restaurant and refreshment business. Since 1882 the proportion of females in the labouring class has risen by nearly 2 per cent to 29 per cent; the proportion in the employee class fully 21/2 per cent, i. e., to over 6 per cent. On the other hand, the relative proportion among the independent workers has remained unaltered at about 20 per cent. In the division restaurant and refreshment rooms, 2/3rds of all persons employed are females; in the textile industry there are as many females as males employed; in the clothing trade and in agricultural occupations the males are only slightly in the majority. The largest number of

independent female workers are found in the clothing trade with 48 per cent; more than 1/4 (26 per cent) of the employees in this branch, as well as in the restaurant and refreshment room business, are females.

Position of members of families and dependents.

A fourth category of persons engaged in occupations, numbering 3-4 million, is that of those who assist in the family of which they are members. The majority of these (2.97 millions) are employed in agricultural

occupations, and only 129,000 and 284,000 respectively in industry and trade.

Secondary occupations.

There are many Germans who do not earn their living by one occupation exclusively, but who, besides being engaged in their principal occupation, also earn

something in other branches of industry.

Thus in 1895 1/7th of all wage earners,—as against 1/5th in 1882—and 9 per cent of persons with independent means and if no stated occupation, had an occupation of secondary importance; this proportion was made up of about 1/8th of those earning their living principally by agriculture, just 1/5th by industry and about 1/6th by trade and commerce. Almost a third part of the secondary occupation was of an agricultural nature, and 1/10th of all persons earning a livelihood by secondary occupations were women. These figures cannot, however, be actually relied upon except as far as the agricultural occupations are concerned.

The following statistics for 1895 show the ages of those earning their living:

Ages	Number of 1,000 persons earning a livelihood	Percentage of all persons of the given age	Percentage of all persons earning a livelihood	
Under 14	3,980 9,469 5,460 1,680	1·1 62·9 62·0 58·4 42·2 29·2	0·9 19·2 45·6 26·3 8·1 2·0	
Total.	20,771	40.1	100-0	

The productive ability of the population from a political economical point of view devolves upon persons between the ages of 14 and 60. Amongst the female population, nearly half, exclusive of domestic servants, were occupied in earning their own living, the preponderating number being between sixteen and twenty years of age; between the ages of 20 and 30, however, the number of females earning their living was only 1/3rd in consequence of marriage; of the domestic servants 593,000 (44.3 per cent) had

not reached the age of 20, a further 519,000 (38.8 per cent) were between the ages of 20 and 30, making in all 1,113,000 (83.1 per cent) under 30, while only 1/6th were over 30.

Child labour.

As far as child labour was concerned, it was ascertained that, including those employed in household service, 215,000 children under 14 were engaged in

earning their living. Over 3/5ths of these were engaged in agricultural occupations, and about 1/6th in the industry and 1/6th in household service. These must be regarded throughout as minimum figures, for, as experience has shown, the statements made as to the occupations of children are often very faulty.*)

V. Agriculture.

See Special Treatise.

Ul. Sea-Fishing.

Modern sea-fishing has been but recently introduced in Germany, and the greater portion of the fish for home consumption is still imported from abroad. Until the eighties, sea-fishing used to be carried on exclusively in the old fashion by sailing vessels. It was not until 1885 that the first steamer was employed for fishing. From 1892–1902 the number of vessels employed in the German sea-fisheries rose from 87, with a displacement of 4,451 tons, to 401 vessels, with 33,255 tons displacement, employing 3,372 men.**) The annual turnover rose in 1897 to over 23 million marks, 2/3rds of which fell to the share of the North Sea fisheries. Since then, the proceeds

*) In order to enable the constantly occuring abuses in the employment of children to be more effectually dealt with than hitherto, a special Act for the protection of children was passed in 1903. The Act was based upon an inquiry instituted in 1898 and not yet completed, which showed that there were in the German Empire at that date no fewer than 532,000 children under 14 years of age engaged in industrial occupations other than factory work; of these 307,000 were employed in various industries [144,000 in the textile industry, 42,000 in the wood industry, 41,000 in the clothing industry and cleaning trade, 28,000 in the production of articles of food and drink), 18,000 in commerce, 3,000 in the transport branch, 22,000 in hotels and restaurants, 136,000 for carrying service, 36,000 for ordinary messenger service, and 12,000 in other occupations. In addition to these there were the children employed in household service and in agricultural occupations for which the figures are lacking, and those engaged in factories. The number of these latter, thanks to the provisions of the new Factory Regulations of 1891, fell considerably as compared with earlier years, and has only slightly increased during the last period of growth. The figures of the Factory Inspection officials are as follows: in 1890 27,485; in 1892 11,212; in 1895 4,327; in 1898 7,072; in 1900 9,249; in 1901 9,454.

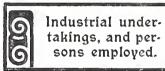
**) These figures, taken from the statistics of the Empire, only include fishing vessels of more than 50 cbms (17.65 register-tons) gross tomage. The total number of registered vessels on September 1st 1903 was 753, with a displacement of 43,600 tons

and employing 4.963 men.

have considerably risen. The import of fresh fish in 1901 amounted to 27.1 million marks, and the import of salted fish to 5.6 million marks. The industry consisted until recently of small concerns; of late, however, a number of large concerns with big capitals have developed. Such fishing companies exist on the North Sea at Emden, Geestemuende, Nordenham, Vegesack, Brake and Elsfleth, Hamburg, Altona and Glueckstadt. Herring fishing continues to be carried on partly by means of sailing vessels, but in the deep-sea fishing on the North Sea, steamers are almost exclusively emploved. In 1897 the amount of capital invested in the North Sea fishery was 2-21/2 million marks: the amount at the present day is fully ten times as large. In the Baltic the fishing industry still consists of small concerns, though a great fish market has grown up at Hela, and at Stettin there are large fish-dealers, who with more than 100 boats purchase the fish from the fishermen out at sea and export it. Besides the springing up of large export businesses, such as the "Nordsee" Co. at Nordenham, the establishment of fishing harbors and fish-markets at Geestemuende, Bremen, Hamburg and Altona (where the turn-over in fish for 1901 amounted in value to nearly 11 million marks) and also at Hela, is of special importance, as is likewise the organisation of the transport by rail. Numberless concerns have arisen for the preparation and sale of fishingtackle, and for the realisation of the products and by-products of the industry.

Ull. Industry and Commerce.

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The intense development of industrial enterprise within the German Empire corresponds to the large number of its different industrial groups. In the year 1895 more than 3,145,000 industrial undertakings were

ascertained to be in existence, and 320 different kinds of industry were classed under 21 different heads.*) These industries employed 10½ million persons, of whom 7,930,000 were men and 2,340,000 women. The industrial nucleus lies in 1,430,000 undertakings with their staff of assistants, employing 8,550,000 or 83 per cent of the total number active in industry. The number of businesses in which only a single person is active (1,710,000) is gradually decreasing. Of the two great groups which can be distinguished in the domain of industrial activity, that of actual manufacture and handicrafts took the foremost place as far back as 1895, with a good two-thirds of all industrial concerns, (68 per cent) and almost four-fifths (78 per cent) of all persons employed in industry. The other division of commerce, transport, lodging and innkeeping, comprised almost one-third

*) There were in addition half a million of secondary undertakings, in which the whole number of persons employed were only incidentally active; these have not been taken into consideration in the above review.

(30 per cent) of all industrial concerns, and one-fifth (21 per cent) of all persons employed; barely one per cent of the total industrial activity is occupied in market gardening, cattle breeding and fishing. According to the number of persons employed, the group Industrial groups. for the manufacture and cleaning of clothes occupies the first position among the various branches of manufacture, comprising as it does more than 13.5 per cent of all persons employed in industry. Next to it comes the commercial division with 13 per cent, and then follow the building trade with 10.2 per cent, the manufacture of food and articles of consumption with 10 per cent, and the textile industry with 9.7 per cent; a lower percentage of persons employed is shown in the metal working trade with 6.2 per cent, the wood industry with 5.8 per cent, machine and instrument making industries with 5.7 per cent, hotel, lodging and licensed victuallers' occupation with 5.6 per cent, quarrying and brickmaking with 5.4 per cent, and mining, foundries and salt-works with 5.2 per cent. The smallest number of persons industrially active, apart from the non-industrial groups of art and assurance, as well as cattle-breeding, fishing and market-gardening, is to be found in the illuminating material branch, &c. with 0.6 per cent, and in the chemical industry with 1.1 per cent. If classified according to the number of concerns, the groups form a different arrangement. The group for the manufacture and cleaning of clothes and the commercial division, however, again head the list with 27 and 20 per cent respectively; a long way after these two groups, which almost comprise half of all enterprises, come the others, for the next group, that of the manufacture of food and articles of consumption only comprises 8.6 per cent of all undertakings; it is closely followed by the hotel, lodging and licensedvictuallers' calling with 7.5, the wood industry with 7.0 per cent, the textile industry with 6.5 per cent, the building trade with 6.3 per cent and the metal-working industry with 5.1 per cent of all existing undertakings. Mining, foundries and salt mines with 0.1 per cent, and the manufacture of illuminating materials with 0.2 per cent, occupy the lowest places in the list. The causes for the difference between the number of Sizes of the persons employed and the number of undertakings undertakings. of the various groups of trades, are due to the vast differences in the average sizes of the undertakings. Whilst in the clothing and clothes-cleaning, cattle-breeding and fishing groups, only an average of 1.6 persons—and in artistic and commercial groups only an average of 2.1 persons fall to one business, other groups which are inclined to develope into large concerns, and in which domestic industry carried on at home plays an unimportant role, show a far greater average; for instance, the paper industry with 8.7 persons, the polygraphic industry with 9.0 persons, the illuminating material industry with 9.4 persons, the chemical industry with 11-1 persons, the stone and earth industry with 11-6 persons, and—far

above all other groups—the great mining, foundry and salt mining companies

with an average of 130 persons employed.

The tendency towards enlargement on the part of all the different concerns has made itself more or less evident since 1882. In the group for mining, &c. the average number of persons falling to one concern has risen from 81 to 130, in quarrying and brickmaking from 7 to 12, in the textile industry from 3 to 5, and the average in all concerns has risen from 2.4 to 3.3. Only the groups organised on a small scale, such as cattle-breeding, fishery, artistic trades, commercial occupations and the clothing branch, show but little increase in the size of their business.

These figures certainly are only of relative value for industrial classification, as the division into separate concerns does not express the commercial grouping of the same into uniformly managed concerns, that is to say, all branch and separate establishments are included, every separate local works, or workshop belonging to a special branch of industry (see p. 27 Total establishments).

The following table shows the division of commercial concerns according to size:

Small retail, middle sized and large businesses in 1895.

Size	1,000 busi-	Percent-	1,000	Percent- age of all	Increase or since 1	
5126	nesses	all busi-	persons employed	persons	Businesses	Persons
		nesses		employed	percen	tage
Small retail businesses (1–5 persons employed). Middle sized concerns (6–50 per-	2,935	93-3	4,771	46.5	1.8	10.0
sons employed). Large businesses (over 50 persons employed)	191	6·1 0·6	2,454 3,044	23·9 29·6	69·7 90·0	76·3 88·7
Giant businesses (over 1,000 per- sons employed).	0.26	0.01	449	4-4	100-8	110-5
Total	3,145	100.0	10,269	100-0	4.6	39-9

Of the total number then, of 31/7 million concerns, more than 9/10ths (93 per cent) are small retail businesses employing 5 persons or less; these businesses however only give employment to 46 per cent of the 101/4 million persons engaged in commerce. The remaining 7 per cent of the concerns absorb 53 per cent of those employed in commerce, whereby the "large businesses" (with over 50 per cent of employees) comprise only 6/10th of the total concerns, but 30 per cent of all persons employed in commercial houses,

i. e., fully 3 million persons. The "Giant concerns," of which there were 255 in 1895, give occupation to nearly 1/2 million employees.

The "middle sized" concerns employing 6-10 persons include 1/17th of all businesses, and 1/4 of all persons employed in commerce. The large concerns belong principally to the industries proper, and the giant concerns almost exclusively so, as they employ over 1/3rd of those engaged in the industries proper; on the other hand, the small retail businesses head the list with 7/10ths of all persons engaged.

In the small retail businesses, one third of those engaged are their own masters, while in the middle sized concerns only 1/3th are masters, and in the larger concerns, only 1.5 out of every 100 persons own a business, whilst 6.7 belong to the staff and 91.8 are workmen. In the industries proper, the difference in the numbers of those having their own businesses and those dependent on them is still more striking.



Home-work industry.

Although now almost everywhere on the decrease, the home-work industry, or work done for another business in the worker's own dwelling, is a feature

of certain branches of trade and manufacture. There were as many as 300,000 such small work-shops, in only 70,000 of which any additional assistance was engaged, and they gave employment to 460,000 persons in all, 200,000 of whom were women. More than 4/5ths of these home-workers belonged to the textile industries and to the cleaning and clothing trade, which means that nearly 2/3rds of all concerns in the textile industry (though embracing only 1/5th of all persons employed) are of the nature of homework concerns. Other branches of industry in which this home-work predominates are the paper-making industry, the wood and saw mill industry and the fine-art trades.



Highest development of largely capitalised businesses. The highest pitch in the development of modern commercial life has been reached in the so-called universalprovider concerns, i. e. undertakings which, acting under a single directorship and control, embrace a number of various branches of commerce, and more

especially in giant private establishments. The combination under one management of the most varied commercial branches in the retail line certainly represents the organisation of incomplete distribution of labour, as, for instance, in the case of small public houses, small retailers and artisans. But in large concerns this massing together of various commercial branches and organisations signifies an acme of concentration both technically and financially effecting a capability of output of the highest order. Whilst in 1895 the 89,000 combines noted did not embrace as many as 3 per cent of all commercial businesses, they now give occupation to no less than 1,700,000 persons, or 1/6th of all persons engaged, in commerce and trade, 1/5th in fact of all persons engaged in the industries. The importance and size of these concerns is still more clearly shown by the table on p. 29 setting forth the driving power employed therein. The greater number of these combines are found in the provision and

drink trade (27,000); in commercial businesses proper (16,000) and in hotel and refreshment room business [13,000]. The above can be finally supplemented by a consideration of the question of ownership of the 1½ million Ownership. concerns where assistants are engaged. By far the larger number (1,280,000) were the property of single proprietors, only 5 per cent (70.000) of them belonging in 1895 to associations or to a number of proprietors. What position, however, do these latter occupy in the commercial business of Germany? They include no less than 1/5th of all those engaged in commercial houses where assistants are employed, as many as 2.83 millions. In the diffusion of the industries, where the 40,000 collective undertakings only make 4.6 per cent of all businesses which employ assistants, they embrace 36.8 per cent of all those engaged (21/2 million persons); that is, in the chemical industry 65 per cent, in the assurance business 69 per cent, in the illuminating material industry 68 per cent, in mining 5/10ths of all persons engaged. Of these combined undertakings (55,000) 4/5ths are in the hauds of companies, working with a total of about 11/2 million employees. The remaining 15,000 collective undertakings are companies, co-operative associations, municipal undertakings and the like, with a total staff of over 11/5 million persons. Of this number in 1895 3,400 joint-stock companies gave employment to about 800,000 persons in 4,750 establishments. Besides these heavily capitalized undertakings and 770 limited liability companies, a not unimportant part is played in German commerce by cooperative associations; in 1895 they had passed the first ten thousand, and comprised 2,200 concerns employing 18,000 assistants. All these figures, however, fail to give a correct idea of the present state of affairs. For during the past 8 years since the last commercial census was taken, combine-concerns and collective undertakings have increased in number and size beyond all expectation. Among state concerns*), the following belong to the Imperial, State Empire: a number of railway work-shops in Alsaceand municipal Lorraine, the Imperial Printing Office, the military workestablishments. shops and Imperial shipbuilding yards, making in all 40 establishments. In addition there is the Imperial bank (see p. 70), which takes a middle place between an Imperial and a private concern. The statistics show a number of 135,000 persons engaged in the 763 various State workshops, &c., mining and smelting ranking first. Onetwentieth of all mining operations and one-eighth of the persons employed in the mining industry come within the province of the Exchequer. In the waggon and ship-building industries, and the engine and machine building yards there are 35,000 men engaged. *) The statistics only show undertakings which are worked on a commercial basis. Amongst others the Postal, Telegraphic and Railway system (see section "Traffic") are not taken into account, with the exception of the workshops belonging to them, as are also street railways. Furthermore, municipal hospitals, slaughter houses, waterworks and public baths are omitted.

In 1895 municipal undertakings were on the increase, though only slightly. By far the greater part of the 1,642 municipal concerns with their 21,000 officials and workmen were employed in the lighting department. In banking and money matters, the municipal savings-banks and pawnshops played a not unimportant part. There were also a number of lucrative municipal institutions and concerns, such as breweries, saw mills, and laundries, working in the interest of the municipal treasury. A recent development of growing importance is the formation of combined undertakings for the purpose Trusts. of regulating the conditions of supply and demand in certain products. In 1902, apart from the purely local combines, there were about 350 of these cartels or trusts known. The majority have been formed in the chemical industry, the iron industry, in quarries and brickmaking, and the textile industry. Further, the participation of German business men in numerous international trusts (41 in 1897) must also be referred to here. The facts stated as to the division of the population Machines and commercially and according to occupation only assume machine power. their proper significance, as far as the country's industrial and commercial capabilities are concerned, when the figures are referred to which show the number of machines and engines in the various branches for executing mechanical work. In 1895 there were in all 164,500 concerns (or 41/2 per cent of all the concerns in Germany) employing motors with a total force of 3.43 Million h.p.*] nearly 4/5ths of this total is produced by steam, and not quite 1/5th by water-power. Other driving means employed are gas, petroleum, compressed air and wind**), which make together only about 2.2 per cent of the whole power. 1/5 of all works employing power (58,000) use steam; nearly as many (54,000) use water, about a ninth part use wind power, and fully 9 per cent use gas. Steam is to be universally found throughout the larger Work done by works, water power on the other hand being only used power engines. to any considerable extent in smaller works. The total horse-power employed has risen considerably since 1895. The advances made in electro-technology have enabled numerous electric systems for illuminating purposes, driving street cars and factories to be laid down. The use of gas engines of all sizes has also become much more general. The number of stationary and travelling steam engines in Prussia sexclusive of the engines of the army and navy authorities, locomotives and marine engines) increased by 70 per cent from 1895 to 1902. This development being similar in the remaining Federal Staates, the present total of all mechanical power employed for industrial purposes throughout the empire may be estimated at 6 million horse-*) These figures do not by a long way express the mechanical power employed in Germany. They do not include all the machines employed in the agricultural industry, in non-commercial public works and concerns (such as railways), nor the engines employed in navigation, which in 1895 made a total of at least 8 million h.p. **) The power converted into electricity is not shown separately in the statistics. power. If all the other mechanical power employed including locomotives and marine engines be added to this, the estimate must be placed at least at twice that figure. i. e. 12 million horse-power.

The greatest number of engine-driven works are found in the industries connected with the preparation of food and drink, such as corn-grinding, baking, brewing, distilling and beet-sugar making. Nearly half of these concerns (42 per cent) are provided with engine-driven plants. The machine-saws which are so universal in wood-work and joinery make this industry the second in the employment of machinery. Next come railways, navigation, the textile and hardware industries. These five branches of industry include nearly 3/4ths of all machine-driven works. The greatest total of driving power is employed in mining and smelting, viz. 995,000 h. p. or 29 per cent of the whole—averaging 557 h.p. to each plant—although only 1 per cent of all works employing driving power is represented by these branches of industry.

Power engines and size of works.

The division of the mechanical forces employed, according to the dimensions of the various works in 1895, gives the following results:

Works employing	Percentage of all works	Number of 100 persons employed	Number of every 100 h.p. employed	
	in each division			
1—5 persons	93.2	45-4	11.5	
6–20 ,,	5.3	14.7	10.5	
21–100 ,,	1.2	15.8	19.3	
Over 100 "	0.3	24.1	58·7	

The larger concerns employing over 100 persons, though constituting scarcely 1/3rd of the total number of works, employed altogether 1/4th of all persons engaged in such occupations, and 3/5ths of the total engine-power used industrially. It is around them that the industrial output of the nation clusters.

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Working machines.

The manner in which the total effective force is employed is best illustrated by details of the machines used. In 1895 the following machines were chiefly in use:

	1,000 machines	Number in small concerns (1,000 machines)	
Textile industry: Roving and spinning machines Silk spinning do	10,072 306 41 255	51·3 4·1 0·1 0·9	

	1,000 machines	Number in small concerns (1,000 machines)
Jacquard looms hand	23	9-7
Other looms hand	75	37.5
Carding engines	38	1.5
Mill runs (Flour making)	114	89-6
Saws (Carving and wood-work) .	119	43.6
Circular and endless saws (do.) .	43	13.1
Metal-cutting machines	35	0.7
 Ovens for bricks and earthenware	28	17.4

As can be seen, the textile industry employs the most machines, though utilising only 15 per cent of the total engine power in use in the industries. The figures showing the number of machines employed in small concerns prove how important a part these small establishments play in certain branches of industry. Nevertheless, the small proportion of power-driven looms employed in small concerns shows clearly the backward state of the technology of the majority of these small establishments.

Ulll. Patents.

The protection of inventions and of intellectual property offered by the Patent Acts of 1877 and 1891 had been of no small importance for the rapid growth of German industry. Since, 1877, and up to the end 1902, as many as 139,000 patents were granted and 191,000 "utility models" were protected. These figures are divided as follows:

	Patents granted 1877—1902	Utility models registered 1891–1902
Total	139,092	190,602
Relating to electric apparatus	6,265 5,866 5,524 5,101 5,073 5,009	7,487 4,495 7,478 3,038 21,648 1,626

	Patents granted 1877—1902	Utility models applied for in 1902
Inventors place of residence:		
Germany	92,189	26,317
Other countries	46,903	1,166

Beside the objects protected by patents and the registration of "utility models," trade-marks were registered, under the Trade-marks Acts of October 1st 1894, on some 57,391 articles in common use, thus characterising them as the goods of certain firms and of a particular quality.

The number of patents granted grows every year, as does also that of the "utility models" registered; the number of trade-marks registered annually is however slowly decreasing.

IX. Industrial activity and production.



Increased productivity of the industries. The capabilities of German industry have at least kept pace with the increase of mechanical power and the expansion of industrial enterprise. This becomes at once apparent if the results of the commercial and industrial

census are compared with the figures showing the products at the present day; in many respects the productive capability of the industries has grown more quickly than the amount of working power employed, and the increase in the number of concerns and amount of capital invested in them. Improvements in technological respects and matters of organisation have allowed a full application in the industries of the law of increasing returns, and the agricultural industry has enabled the nation to work in many places against the contrary law which holds good in agriculture.

The iron mining industry for example, as can be seen from the following summary, has made perfectly astounding progress in respect of productivity. In spite of a considerable decrease in the number of persons engaged, the out-put has risen to half as much again. In the beet-sugar industry an increase of 2/5ths in the number of persons employed has taken place, but the output has been nearly trebled. In the coal mining and brewing industries on the other hand, the number of persons employed and the total amount of products have both increased in the same ratio. It must, however, be added here that the brewing industry in particular has made considerable progress in every direction, a progress which has rather increased the excellence of the products than the lucrativeness of the industry.

The figures for 1895 were:

Productiveness.

	Persons employed in thousands	Increase or decreas since 1882			
		Buik produced	Persons	Products	
	tnousands		percentage		
Iron mines	95.2	12,350 (1,000 ts) 1,167 ,, 79,169 ,, 55,250 (1,000 hls)	- 31·0 + 41·4 + 48·6 + 43·2	+ 49·5 + 194·6 + 51·9 + 41·5	

A similar satisfactory state is shown by the mining results which give an idea of the development of the coal and iron industries, the two chief industries and the basis of the entire commercial activity of modern times, during the last decades of the nineteenth century. As shown by the following tables, the following changes took place in regard to number of persons employed and the bulk of products since 1880:

		se since 80		oroduction orkman	Increase in productiveness
	Persons	Products	1900	1880	since 1880
	perce	ntage	to	ns	percentage
Bituminous coal mines	131	133	262	264	1
lron mines	22	162	202	433	114
Pig-iron works	64	212	129	245	90
lron foundries	167	249	14.4	18 ⁻ 8	31
Weld iron works	- 25	-25	26.7	26·6	0
lngot iron works	520	864	32.8	51.0	56

Chief mining statistics for 1880–1902.

Production in 1,000 tons.—Employees in 1,000 men.—Value in 1,000,000 marks.

	1880	1890	1895	1900	1901	1902
Bituminous coal: (Dines at Work Employees Production Value	484	408	319	318	315	308
	178·8	262·5	303·9	413·7	448	451·2
	46,974	70,238	79,169	109,290	108,539	107,474
	246	538	539	966	1,015	1,057
Iron ore: (Dines at Work Employees Production Ualue	831	755	491	575	522	462
	35·8	38·8	33.6	43·8	40 ⁻ 8	39·2
	7,239	11,406	12,350	18,964	16,570	17,964
	34	48	41	78	72	66

	1880	1890	1895	1900	1901	1902
Pig-iron: Blast furnaces at work Employees Production	246	222	212	274	263	241
	21·1	24·9	24·1	34·7	32·4	32·4
	2,729	4,658	5,465	8,521	7,880	8,530
	163	268	237	551	492	456
Cast iron: Foundries	1,034	1,148	1,232	1,253	1,249	1,295
	35·7	64	67·9	95·5	85·7	84·5
	515	1,027	1,155	1,796	1,513	1,570
	95	187	185	349	273	262
Weld iron and Steel: Works	335	255	208	174	164	156
	51·2	54	38·2	38·2	31·6	27·5
	1,358	1,559	1,077	1,016	823	895
	201	234	150	179	123	120
Ingot iron and Steel works: Works Employees Production Value	53	115	149	189	200	199
	20 ⁻ 1	52·8	75·1	124·7	121·9	126·4
	661	2,032	3,962	6,362	6,211	7,422
	136	329	413	863	794	848

In addition to these, 1,600,000 tons of zinc, lead and copper ore valued at 60,000,000 marks, and 4,500,000 tons of stone and potash salts valued at 48 million marks were mined. The foundries produced 325,000 tons of zinc, lead and copper, representing a value of 135 million marks. The extraction of salt from solutions was carried on in 1901 in 121 principal and 87 secondary establisments, employing 8,650 hands, and producing 1,121,000 tons at a value of 64,000,000 marks.



Crisis in 1900.

The iron crisis of 1900/1902 interrupted the progressive development for a time (as can be seen from the decrease in the returns of production, value and em-

ployees for that period). Owing to the fact that in order to fulfil the coal mining contracts which had been put on one side during the crisis, increased exertions were required after the crisis had passed, the number of employees in the coal mines rose, although the amount produced remained the same.



Statistics of production for 1897.

The statistics for 1897, drawn up at the instigation of the Home Office, give a fair idea of the present state of the entire commercial productions of the German

Empire. The products of some of the German industries in the year 1897 were as follows:

	Amount in 1,000 tons	Value in mil- lion marks		Amount in 1,000 tons	Value in mil- lion marks
l. Mining, smelting works and salt works. Mining. Bituminous coal Brown coal (lignite) . Ore Salts Blast furnaces (in-	90,451 26,915 11,938 3,156	733 78 135 39	Flax Jute Worsted Carded Chappe Yarns (entirely manufactured) Woven goods	-	43 38 275 259 2
got and weld iron Rolling mills). Pig-iron, ingots Partly manufactured Entirely manufact-	5,556 1,654	443 144	Amongst them: Cotton woven goods Linen Jute Cloth, Buckskin,	_ _ _	448 83 46
ured	5,062 — — 525 —	86 74 115 114	flannel	 - - - -	364 266 115 195 13 141 104 53
Foundries	1,584	318	Network manufact- ures	_	3
machines, instru- ments, &c. Boiler works of all			Ull. Paper industry. Wood cutting Cellulose manufact-	769	26
kinds	_	78 80 620	ure	250 778	48 205
Locomotives and loco- mobiles	=	62 72	dustries	_	272
car construction U. Chemical manufact- ures	- 8,311	63 948	industries	16 —	79 336
VI. Textile manufactures. Yarns (partly manufactured)	524	835	X. Articles of food and consumption. (Danufact. of starch fexclusive of rice		
Amongst them: Cotton yarn	_	315	starch)	_	46 325

A total summary of these values is difficult because some of the groups appear twice. A part of the value of coal, for instance, appears in the manufactures belonging to other industries. The estimate of the value of these industries varies between a total of 8,100 and 9,250 million marks.

X. Cost of Living.

National wealth and income.

The German nation, according to Schmoller, has at its disposal a capital of about 175 to 200 milliard marks (the highest estimates are 250 milliards) which in-

cludes a floating capital invested in stocks of about 45 to 50 milliards. The national income amounted, according to the most careful calculations made by May, to 31.2 milliards in 1900, as compared with 25.4 milliards in 1895; on an average there were 550 marks income to every head of the population.

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Distribution of income.

Persons earning their own livelihood with incomes up to 3,000 marks, and those persons with higher incomes, took the following share in the total national income:

Single income	Total	income	1895	Increase in 1900	
Marks	Milliard marks	Percentage	Milliard marks	Percentage	
up to 3,000	22.87	73-4	19.50	17	
over 3,000	8-30	26.6	5-89	41	
total	31.17	100-0	25.39	23	

The total national income has therefore increased by a quarter during the last five years, a period however of great growth in trade. Those incomes over 3,000 marks took twice as large a share in this increase as those below that sum. The population increased during the same period by 7.8 per cent.

42 per cent of the total income in 1900 (12.9 milliard marks) belonged to the labouring classes (including servants), which numbered 15.5 millions of all persons earning their own livelihood or 59 per cent.

A more accurate idea of the development and distribution of the national income can be gained from the Prussian tax list for 1902:

The population of Prussia was shown by the returns to amount to 34,550,000 (about 3/5ths of the inhabitants of the whole Empire); of these, 3,760,000 physical (physisch) persons, or 10.9 per cent of the total population, possessed a taxable income exceeding 900 marks (on an average 2,277 marks per person), on which an income tax of 170,200,000 marks (an average of 45.3 marks per person) was levied. In addition there were 2,670 juridical (juristisch) persons possessing a total income of 476,000,000 marks paying an income tax of 18,640,000 million marks—450,000 physical persons having incomes over 3,000 marks, amounting in all to 4,793,000,000 marks. This sum was made up of 1,237,000,000 marks income from capital, 996,000,000 marks from landed property, 1,475,000,000 marks from trade, commerce and mining, and 1,084,000,000 marks from other profitable occupations.

Deductions amounting to 693,000,000 marks were made for interest
on debts, permanent charges, and other legal, non-taxable items, so that
the group of "Zensiten" referred to only had to pay taxes on 4,100,000,000
marks, which amounted to 121,100,000 marks, or 71.2 per cent of the entire
amount raised by taxes from physical (physisch) persons.
The division of the single tax groups was as follows:

Amount of income	Zensits		Amount of tax		
Marks	1,000 persons	Percentage	Million marks	Percentage	
900-3,000 3,001-9,500 9,501-100,000 Over 100,000	3,310 369 78 3	88·0 9·8 2·1 0·1	49.0 42.0 52.7 26.5	28·8 24·7 31·0 15·5	
Total	3,759	100.0	170.2	100.0	

The conditions of income in towns and in the country show a great variation:

	Towns	Country	Total
Total population 1,000 persons Assessed to pay taxes,	15,031	19,520	34,551
including dependents 1,000 persons	6,742	5,485	12,227
do percentage	44.9	28-1	35.4
Income assessed million marks	6,002	2558	8,560
Amount of tax 1,000 marks	128,239	41,955	170,193
Per head of the populat-			·
ion marks	8.53	2.15	4.93

The number of physical (physisch) persons (without dependents) assessed, rose between 1892 and 1902 by 54 per cent, their share in the total population from 8·15 per cent to 10·88 per cent, the amount of taxes at which they were assessed by 48 per cent, whilst the total population only increased to the extent of 15·6 per cent.

Corresponding to the above, the taxation statistics of Saxony, which are also made up of quite small incomes, show an increase in the number of assessable Zensits quite out of proportion to the growth of the entire population in spite of a slight increase (from under 300 to under 400 marks) in those incomes exempt from taxation, and, further, a relatively much larger increase in total income and the amount of taxes, viz.:

	1880	1900	Percentage of increase
Number of inhabitants 1,000 persons Zensits 1,000 persons Income assessed million marks ,, per head of population marks Amount of tax 1,000 marks	2,973	4,202	41·3
	1,120	1,746	56·0
	982	2,214	125·6
	877	1,268	44·7
	12,116	35,243	190·8

Capitalism in Prussia.

The income-tax in Prussia also gives a fair idea of the capitalism of 3/5ths of the German nation. The following are the main results arrived at from the assess-

ments made during the period 1902-1904:

			Towns	Country	Total
Total population Zensits assessed with a rateable income of over	1,000	persons	15,031	19,520	34,551
6,000 marks (including dependents)	1,000	persons	1,951	2,821	4,773
pulation	per	cent	13.0	14.5	13.8
Assessed income viz.:			47,581	28,076	75,657
Capital	22	,,	23,236	5,552	28,788
Landed property Capital invested and wor-	97	"	17,312	10,936	28,248
king capital	**	,,	9,034	1,435	10,469
Independent exemptions and privilegies	7*	77	68	67	134
Capital value of debts exempt			10,207	4,211	14,418
Amount of tax	1,000	marks	23,874	13,042	36,917
Per head of population			1.59	0.67	1.07

The amount of property-tax levied may be divided as follows:

Ualue of property	Number of per-	sons taxed	Amount of tax	kes levied
in marks	1,000 persons	percentage	Million marks	percentage
6,000-52,000 52,000-500,000 Over 500,000	140·2 240·5 16·8	80·2 18·5 1·3	9,373 15,021 12,523	25·4 40·7 33·9

The 6,601 millionaires assessed (0.51 of all persons paying income) paid alone 8,888,000 in taxes, i. e. 24.07 per cent of the total amount levied. The Bavarian private income-tax showed the following Bavarian private difference in the 16 years between the financial periods income-tax. 1882/83 and 1898/99. The number of persons assessed increased by 15.7 per cent. Among persons drawing quite small incomes of 40 to 100 marks—from investments of capital, the increase amounted to only 2.6 per cent; among those drawing an income of 400 to 1000 marks the increase in number amounted to as much as 17 per cent, while the wealthy class, with private incomes of more than 12.000 marks, has more than doubled. During this period the population of Bavaria increased about 12.6 per cent, while the amount of income-tax levied increased 55.4 per cent. The condition of the savings-banks also testifies to the spread of improved conditions. The following Savings-banks. figures are for Prussia: Increase in 1880 1901 percentage 9,035 Savings-bank books (thousands)..... 2.942 207 Number of books per 100 inhabitants . . 25.8 139 10.8 Amounts deposited (million marks) ... 1.595 6,236 291 Amount per book (marks) 543 691 27 The number of savings-bank books in Prussia has consequently been more than trebled during the 21 years from 1880 to 1901, and in 1901 amounted to over 9 millions, so that every fourth person has a book. In 1880 there was only one savings-bank book to every 9 inhabitants. The total amount deposited has increased during this period to nearly four times what it was, and at the end of 1901 had grown to 61/4 milliard marks. the books themselves, 27.9 per cent were for amounts up to 60 marks, 28.3 per cent between 60 and 300 marks, 39.2 per cent between 300 and 3,000 marks, and 4.2 per cent were over 3,000 marks. Up to the end of 1900 the amounts deposited throughout the whole Empire had grown to 8.86 milliard marks, and were distributed among 13,860,000 books; this means one savings-bank book to every four inhabitants of Germany. A further proof of the improved financial status of the majority of the population is furnished by the Wages. rise in wages; this can, to a certain extent, be traced by following the amounts paid in to sick and old age assurance societies. The following table shows how every hundred weekly contributions are

distributed among the various wage classes:

Class	Yearly earnings	1891	1901	
1.	Below 350 marks	25.3	17.9	
11.	351-550 ,,	38.4	33.6	
111.	551-850 ,,	21.7	23.9	
10.	851-1,150 ,,	1 11-6	$\begin{vmatrix} 16.2 \\ 8.4 \end{vmatrix} = 24.6$	
U.	Above 1,150 ,,	14.6	8.4 = 24.6	

The relative proportion of wages of small amounts has steadily decreased since 1891. The fact that in 1891 a new class or division for wages amounting yearly to over 1,150 marks had to be added to the four existing ones, shows clearly the tendency of the level of wages to rise generally.

When one considers that the average chargeable wages (in 64 co-operative associations) were 612 marks in 1888 and (in 65 co-operative associations) 804 marks in 1901, that in the Ruhr district the average daily wages paid in the whole mines of 3.21 marks during the five years from 1888/92, had risen to 3.95 marks in the five years from 1898/1902, and that the average yearly income had risen during the same period from 987 marks to 1,223 marks, it is quite evident that increased national property has favourably affected all grades of society.



Consumption of commodities.

The increased consumption of commodities confirms this. To-day there is a very much larger consumption per head of the most important provisions and raw mate-

rials than there was 20 or 30 years ago.

	Co	onsumption		Compar	ed with
Specification of goods	yearly average	total	per head	yearly average	con- sumption per head
	in	1,000 ts	kgs	in	kgs
Rye	1893/1901	8,026	148.6	1880/84	121.0
Wheat and spelt	"	4,765	88-2	11	about 65
Barley	,,	3,716	68.8	11	46.6
Oats	"	5,960	110.4	11	82.1
Potatoes	,,	31,886	590.5	11	339-9
		10,000 hls	liters		liters
Alcohol	1902	351	6-1	1889	5-4
for trade purposes	17	111	1.9	"	0.9
Beer	1901	7,080	124	1879/83	85
in North Germany	17	4,709	105	11	63
in Bavaria	,,	1,524	245	11	213
		1,000 ts	kgs		kgs
Tobacco	77	93	1.6	1876/80	1.7
Salt in the whole	11	1,040	18-2	1877/81	13-3

	C	onsumption		Compar	ed with
Specification of goods	yearly average .in	total	per head kgs	yearly average in	con- sumption per head kgs
Salt for the table	1901	436	7·6 11·6	1877/81	7·7 5·8
Sugar	1902 1901		2,667	1876/80	1,170
Pig-iron	?? ??	7,857 1,027	137·8 17·7	11 11	51·6 5·4
Raw cotton	1902	336 8·9	5·79 0·15	11	2·86 0·12
Salted herrings Raw coffee	77	235 171	4·06 2·95	"	2·38 2·33
Cocoa beans	**	19·6 129	0·34 2·23	77	0·05 1·66
Fruits, foreign	17	145 3·4	2·51 0·06	"	0·61 0·03
Jute	11	133.9	2.31	11 11	0.32

The consumption of wheat and potatoes per head is subject to fluctuation from year to year according to the harvests and prices; on an average however the consumption of wheat has risen by 1/4, and of potatoes by 2/3rds per head during the last 20 years. The increase in the consumption of alcohol must be attributed exclusively to the increased use of spirits in various industries, which has doubled since the close of the eighties; the consumption of brandy for private purposes shows a slight but constant decrease during the same period. Likewise the consumption of beer, which was increasing considerably until a few years ago, now shows a tendency to decrease. The same with tobacco. Salt is consumed at a constant rate per head, while the consumption of rock salt for feeding animals and other purposes has been doubled in the last 20 years. The amount of sugar used has also been doubled.

The years 1901 and 1902, it is true, show a noticeable decrease in consumption, but this is doubtless only temporary, as in consequence of the Brussels Convention the prices of sugar have fallen. The consumption of coals and pig-iron has increased two and a half times during the last 25 years, and of petroleum three times. Among commodities coming exclusively from foreign parts, cocoa and jute show the greatest increase, almost 7 times as much being supplied as 25 years ago. The consumption of foreign fruits has increased 5 times, that of cotton twice. There is also a large increase in the amount of tea, herrings and rice consumed. Butcher's meat averages at present over 40 kgs per head per annum; in 1860 it only amounted to 17 kgs.

This increase in the consumption of commodities is Prices. due in the first place to the increased purchasing power of the masses, and wages having risen, and prices, in many cases, having fallen through improvements in modern technology which have immensely increased industrial productivity, and developed and cheapened means of transport. In the case of 29 important wholesale commodities, the prices have experienced an average decrease of about 1/4 during the last generation. In some instances the fall in prices has been still greater; for instance. sugar has been reduced by a good half*) in price (not taking into consideration the further considerable reduction as a consequence of the Brussels Convention since held), cotton and spirits by nearly half, wool, pig-iron and lead by more than 1/3rd. On the other hand butcher's meat has risen 7 per cent in price, coals 11 per cent, comparing the average prices during the years 1871 to 1880 with those of the years 1891 to 1900. There has also been a general rise in rents. Still enough has been said. to prove beyond a doubt that the German nation has advanced greatly in its standard of comfort and wealth during the last generation.

Xl. Foreign trade.

Development of German foreign trade. In the year 1903 a foreign trade amounting to 85 million tons, and of a value as far as can be at present calculated of 11.4 milliards of marks passed through the

German customs**). German foreign trade has reached this high level through development which commenced in the fourth decade of the 19th century, and which has rapidly increased with every decade. The progressive returns of the German customs are shown in the following table:

	1880	1890	1895	1900	1901	1902	Increase
			Million	marks			in percentage 1880-1902
lmports Exports	2,844 2,977	4,273 3,410	4,246 3,424	6,043 4,753	5,710 4,513	5,806 4,813	104 62
Total	5,821	7,683	7,670	10,796	10,223	10,619	83
Pe	r head o	f the ave	rage pop	ulation of	customs	district	
		- 1	Ma	irks			
Imports	63·9 66·8	86·5 69·2	81·4 65·6	107·4 84·5	100·0 79·1	98·8 81·9	55 23
Total	130.7	155.7	147.0	191.1	179.1	180.7	38

^{*)} The considerable decrease in prices due to the influence of the Brussels Sugar Convention is not included in this return.

^{**)} The figures will be considerably higher when the definite special values are ascertained.

The value of the foreign trade, as we have seen above, has increased in
a considerably quicker ratio than the population. In the year 1902, the foreign
trade represented 181 marks per head of the population as compared with
131 marks per head in 1880, i.e. an increase of almost 2/5 per head. In 1903
the amount per head was estimated at almost 200 marks.

German foreig	n trade in	1902.			
Total imports	and Expo	rts*)			
	Imports	Exports	Total		
	1,000 ts	1,000 ts	1,000 ts		
Quantity Total	44,134.5	36,075 ⁻ 1	80,209.6		
cluded in above	1.2	0.4	1.6		
	ln million marks				
Value Precious metals, in-	6,093·5	5,130.8	11,234.3		
cluded in above	174.8	135.0	309-8		
Special trade**) i	n the year	1902***)			
	ln	thousand to	ns		
Quantity Total	43,335.7	35,029 ⁻ 6	78,365·3		
cluded in above	1.2	0-4	1.6		
	ln million marks				
Value Precious metals, in-	5,805.8	4,812.8	10,618 ⁻ 6		
cluded in above	174.8	135.0	309-8		

Increase in weight.

In 1880 the weight of the merchandise in special trade amounted to 30,572,000 tons; thus there has been an increase of 156 per cent by 1902+), whereas in the

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matter of value the increase has been over 83 per cent.

*) The whole export and import trade comprises: 1. Importation of general goods except bonding-house and credit goods, the importation of raw material for manufacture and the importation of bonding-house credit goods. 2. The exportation of general goods, including those subject to a home duty (beer, brandy, salt, tobacco, sugar), the exportation of all manufactured goods, as also of bonded and credit goods.

**) The special trade comprises: The import of general goods, direct or with bills of lading, the import of general bonded or credit goods, and the import to undergo manufacture on home account. The export of general goods, including those home wares exported under customs supervision and subject to a consumption tax (beer, &c.), and export goods after they have undergone manufacture on home account.

***) The figures obtainable for 1903 are: imports 47.0 million tons, valued at 6.3 milliards marks; exports 38.3 millions tons, valued at 5.1 milliard marks; total trade 85.3 million tons, valued at 11.4 milliard marks. The precious metals included in these figures represent a value in the imports of 315 million, in the exports of 116 million, together a total value of 431 million marks.

+) The increase in weight up to 1903 was 179 per cent.



Difficulty of exact statistics of foreign trade.

Owing to the geographical position of Germany in the centre of Europe, it is not always possible to determine with perfect accuracy the place of origin and destination of goods; for goods pass, not only through Dutch,

Belgian and French ports, but also through Trieste and Genoa by the St. Gothard railway; England also is often erroneously regarded as the place of origin or destination of goods passing through Germany. In proportion to the growing independence of Germany's trade beyond the seas, this error has gradually declined in importance. Finally, the free port of Hamburg is a factor liable to cause errors in German trade statistics. Still the reports returned by the admirably systematised statistics of German foreign trade may be looked upon as fairly reliable.

Dore than 1 per cent of the whole German trade in 1902 fell to the following countries:

	Million	Percentage
	marks	
1. Great Britain	1,576-1	14.86
2. United States of America	1,360.3	12.82
3. Austria-Hungary	1,252.6	11.80
4. Russia and Finnland	1,145.7	10.79
5. The Netherlands	599.7	5.26
6. France, with Algeria and Cunis	269-7	5.37
7. Belgium	457.4	4.31
8. Switzerland	454.0	4.28
9. Italy	322-5	3.04
10. British India, with Indo China and Malacca	308.6	2.91
11. Argentina	249.0	2.34
12. Denmark	205.8	1.04
13. Sweden	199.6	1.88
14. Australia	165.7	1.56
15. Brazil	162.4	1.53
16. Chili	145.3	1.37
17. Roumania	134.0	1.26
18. Spain	130.7	1.23
19. Dutch Indies	114.4	1.08



Part taken by the several countries in German imports.

This list undergoes some alternation if imports and exports are taken separately. Taking countries with a trade of over 20 million marks in 1902, the order was as follows:

Imports into Germany in 1902.

Countries of Origin	Million marks	Percentage
1. United States of America	911.1	15-7
2. Russia and Finland	773.6	13.3
3. Austria-Hungary	719.5	12.4
4. Great Britain	610-6	10-5
5. France, with Algiers and Tunis	315.4	5.4
6. British India, with Ceylon and Malacca	238.4	4-1
7. The Netherlands	206-1	3.5
8. Argentina	201.8	3.5
9. Belgium	196·7	3.4
10. Italy	192-5	3.3
11. Switzerland	138.7	2-9
12. British Australia	120.2	2-1
13. Brazil	118.6	2.0
14. Chili	113.0	1.9
15. Dutch Indies	90-9	1-6
16. Roumania	84.2	1.5
17. Sweden	80.5	1-4
18. Spain	74.9	1-3
19. Denmark	74.7	1.3
20. China, with Hongkong and Kiauchaou	55-6	1.0
21. Egypt	45.6	0.8
22. British West Africa	43.0	0.7
23. Turkey	36.6	0.6
24. Central American Republics	33.0	0.6
25. British South Africa	26-2	0.5
26. Norway	23.8	0-4
27. Free-ports of Hamburg and Cuxhaven	22.3	0.4

German Export in 1902.

Land of destination	Million marks	Percentage
1. Great Britain	965·5 533·1 449·2 393·6 372·1 285·3	20·1 11·1 9·8 8·2 7·7 5·9
7. Belgium	260·7 254·3 131·1	5·4 5·3 2·7

Land of destination	Million marks	Percentage
10. Italy 11. Sweden 12. British India, with Ceylon and Malacca 13. Free-ports of Hamburg and Cuxhaven 14. Norway 15. Spain 16. Japan 17. Roumania 18. China, with Hongkong and Kiauchaou 19. Argentina 20. British Australia 21. Brazil		2.7 2.5 1.5 1.3 1.3 1.2 1.0 1.0 1.0
22. Turkey 23. British North America 24. Mexico 25. British South Africa 26. Chili 27. Dutch India 28. Portugal	43·3 38·7 34·1 33·1 32·3 23·5 20·4	0·9 0·8 0·7 0·7 0·7 0·5 0·4

Export from 1880 to 1902 classified according to countries and routes.

Commercial intercourse is most characteristically represented by following its development according to geographical features. The results are as follows:

	Million marks					
	1880	1890	1895	1900	1901	1902
l. European countries with trade carried on exclusively or almost exclusively by land*)	1,367**)	1,275	1,299	1,809	1,540 1,703 3,243	1,797

*) Free-harbors Hamburg, Cuxhaven, Bremerhaven, Geestemünde, Baden tariff exemption, Austria-Hungary, the Netherlands, Belgium, Switzerland, France (up to 1895 including Algeria and Tunis).

**) Hamburg and Bremen acceded to the Imperial Tariff Union in 1889. The figures of foreign trade in these districts up to that time, as well as goods produced and consumed there, included articles belonging chiefly to trade by sea. Hamburg and Bremen had 600,000 inhabitants in 1880. Taking for granted that dutiable articles valued at 300 marks were consumed per head, 180,000,000 marks worth of German goods sent there for export belonged to land trade, and the remaining 480,000,000 marks worth to maritime trade; these are best included in the countries under group Ill, as all reliable items concerning their source or destination are lacking. The import into Germany from Hamburg and Bremen in 1880, was inconsiderable, so that the total import at that time can be included without hesitation in the maritime trade from countries in group Ill.

			7	Dillion	marks	3	-
		1880	1890	1895	1900	1901	1902
11. European countries	lmport	424	748	793	•		'
with trade carried on	Export	341	381	407		<u> </u>	610
chiefly by sea*)	Total	765	1,129	1,200			· ·
Ill. European countries	lmport	887	799	783			
with trade carried on	Export		1,006	924			
exclusively or almost exclusively by sea **)	Total	1,909	1,805	1,707	2,428	2,209	2,278
IV. United States and Bri-	Import	170	408	512	1,027	1,050	920
tish North America	Export	192	432	385	460	412	488
	Total	362	840	897	1,487	1,462	1,408
U. Mexico, Central and	lmport	66	363	445	571	543	557
South America	Export	25	174	219	239	211	216
	Total	91	537	664	810	754	773
VI. Africa	lmport	17	51	79	147	126	164
	Export	5	22	43	73	71	92
N .	Total	22	73	122	220	197	256
Ull. Asia	Import	66	165	268	392	416	443
V	Export	22	96	122	242	222	216
	Cotal	88	261	390	634	638	659
VIII. Australia	Import	8	51	119	125	111	123
	Export	2	23	23	50	55	47
	Cotal	10	74	142	175	166	170

Although no exact comparison can be made between the figures of the various years for many reasons,—viz., alteration in tariff districts, alteration and improvement in statistical methods and organisation of commerce—the above table gives a clear view of the geographical development of German commerce with foreign countries. Trade with foreign continents has increased considerably more than that with European countries, although not in such proportions as appear from the figures.

Maritime and land trade.

In order to fix the proportions which land and maritime trade bear to each other, the low figures in group Il can be calculated as equivalent to the inconsiderable

maritime trade in group l. The annual maritime trade percentage of the total trade is as follows:

	1880	1890	1895	1900	1901	1902
Imports	57.8		40.0			72.1
Exports	54·0 56·2	62.6	62·0 66·8	61·9 67·9	62·2 68·3	62·6 67·8

^{*)} Russia (up to 1895 including Finland), Italy, Denmark, Servia.

**) Tariff exemption: Heligoland, Great Britain and Ireland, Greece, Sweden, Norway, Finland (since 1900), Gibraltar, Malta, Cyprus, Spain, Portugal, Bulgaria, Roumania, Turkey (up to 1895 including Asiatic and African provinces).

Although the land-trade in 1880 was only slightly less than the maritime trade, at the close of the century the latter had increased to double the amount of the land-trade. The increase is rather due to greater imports than to exports.

The transformation in the character of foreign trade.

The most significant aspect of the development of German foreign trade, in addition to its increase in quantity, is the complete transformation in its character. Since 1870 Germany has developed from a

country engaged chiefly in exporting agricultural products to one in which importation of such products predominates. In former times the export of agricultural products served chiefly as payment for the importation of industrial and tropical products.

At the present time 1/4 of the food required in Germany is imported from foreign countries; industry also demands constantly increasing amounts of raw materials from foreign countries for its products. Imports, on the contrary, consist chiefly of manufactures, which are constantly becoming more qualified.

The development made in this direction during the last decade was as follows:

	lmpo	rt (value in	million ma	rks)
	1891-1895	1895-1900	1901	1902
Raw materials for industrial purposes	1,762·1 964·3	2,404·1 1,137·8	2,510·8 1,145·0	2,600 ⁻ 6 1,189 ⁻ 8
cacies; live stock Precious metals, in bars or	1,629-5	1,852.3	2,071.3	2,128.3
coined	223·8 4,579·7	276·4 4,670·6	289·1 6,016·2	174·8 6,093·5
	Export (value in million marks)			
	1891-1895	1895-1900	1901	1902
Raw materials for industrial purposes	727·2 2,104·1	978·3 2,630·3	1,132·5 2,987·8	1,211 [.] 9 3,182 [.] 3
cacies; live stock	597.5	671.2	623.7	601 ⁻ 6
coined	141.8	189·4	81.2	135.0
Cotal	3,570.6	4,469.2	4,825.2	5,130-8

The summarised figures of import and export are as follows:

		Excess of in	nports of:		
		articles of food, table delicacies and live stock	raw ma- terials for industrial purposes	Excess of exports of manufactures	
			Million marks		
	1890	926.3	1,059-1	1,194.8	
	1892	1,134.3	1,023.6	1,109.3	
1	1894	1,023.2	997.8	1,052.6	
1	1896	1,031.3	1,112.8	1,387.2	
	1898	1,315.0	1,390.2	1,387.5	
	1900	1,245.2	1,691.7	1,782-7	
	1902	1,542.0	1,397.4	1,986.2	

The trade returns of 1902 showed the following figures, classified under the heading of the various goods. Only such classes are included which exceed 200 million marks in import and export:

	Imports	Exports
	Million	marks
l. Cattle and living animals	241.6	19.5
products	214.8	42.8
Ill. Fuel	165.4	270.3
1. Raw materials	1,564.3	263.5
2. Manufactures	322.4	318.6
1. Raw materials	225.8	19.0
2. Manufactures	154.8	37.0
1. Raw materials	211.8	44.6
2. Manufactures	113.1	388.3
1. Ore	106-1	14.9
2. Crude, common metal, including coins	164.9	136-1
3. Plainly worked articles	13.4	183-4
4. Manufactures	29-1	416.8

	lmports	Exports
	Millior	marks
VIII. Raw materials and manufactures of the woodworking, wood-carving and cane industries 1. Raw materials	107·0 146·5 37·6 186·5 154·3 854·5 479·1 87·5	52·3 39·5 88·4 86·5 234·1 182·5 1,030·4 324·0

Commercial balance-sheet. In order to counterbalance the total negative results of commercial movements, which, including the trade in precious metals, is shown in the following figures, viz.,

1890 863 millions, 1892 1,077 millions, 1894 1,234 millions, 1896 805 millions, 1898 1,429 millions, 1900 1,290 millions, 1901 1,198 millions, 1902 993 millions. To these figures must be added the receipts of the sea carrying industry, estimated at present at 300 millions, the many hundreds of million marks profit derived from German capital invested in foreign enterprises the incomes of German capitalists trading in foreign stocks and bonds*) and from operations on foreign exchanges, the receipts from insurance enterprises, the income from the German cable, only in the beginning of its development, and finally the receipts from the constantly increasing number of foreigners travelling in Germany—whereby the expenditures of Germans travelling in foreign countries must be correspondingly allowed for.

Crade with foreign countries and inland market.

A comparison of the development of trade with foreign countries and the increase of inland productive power proves that the receipts from German work increase home consumption, and that the inland market with

the consumptive power of the general public has increased more rapidly than foreign trade.

^{*)} According to reliable information the investments of German capitalists in foreign countries are placed at 15–16 thousand milliards at least one-half of which are invested in countries outside Europe.

XII. Transport and Communication.

A. Post, Telegraphs and Telephones.

Increase in business of the Imperial Post.

Within the jurisdiction of the Imperial Post, which serves 4/5ths of the whole Empire, there has been, since 1870, an enormous increase in business. Whilst

the population during the years 1872-1902 has increased by two-fifths, the number of post-offices at the end of this period has become 51/2 times larger, the staff of employees four times, the number of letters, packages, &c. sent seven times, and the number of telegrams transmitted four times as many as at the beginning of that period. The number of remittances of money, according to the total sum transmitted by the Post, is nearly double what it was, whilst the total receipts have increased to more than four times their former amount. The only department showing a falling-off in business is the travelling post, the number of passengers carried decreasing from 5.6 million to 1.2 millions. Wherever modern means of transport are making headway, there is no room left for the latter mode of conveyance.

The postal systems of Bavaria and Wurtemberg have developed in a manner similar to that of the Imperial Post.

Postal System.

The entire German Postal System was composed at Statistical summary the end of 1902 as follows: about 38,200 post-offices—of the entire German 1480 or one office to every 14.2 sq.-kms and every 1,480 inhabitants, 126,500 letter-boxes serving to effect the

transmission of 6.2 milliard postal despatches in one year. For this purpose the post-office vehicles and officials covered a distance of 338 million kilometres, i. e., 248 million kilometres by rail, 88 million kilometres by road, and a further 1.2 million kilometres by German canals, &c. The marine mail covered an additional 13 million kilometres. (These figures do not include postal messenger service.)

Eight-ninths of the total number of postal despatches Postal despatches. travelled only within the boundaries of the Empire; 246 million came from foreign countries and German

protectorates, whilst 291 million were sent thence from within the Empire. At a rough calculation another 168 million foreign despatches traversed the Empire upon their way to other countries.

Half the total number of dispatches consisted of letters (2 milliard) and post cards (1.2 milliard). The number of post cards sent has doubled during the last five years in consequence of the constantly growing craze for collecting picture post-cards. The enormous increase in the number of letters, too, was largely due to the acquisition by the State of the private postal institutions existing in many of the large towns, as well as to a considerable reduction in the fees for local postage. Besides this 931 million "printed matter" packets were transmitted, 72 million "samples," 10 million "business papers" and no fewer than 1.4 milliard copies of newspapers and 210 million

special supplements to newspapers; 45 million of these despatches were registered. The traffic in packages and valuables further include 201 million ordinary packages, and 13.5 million packages, letters and cases with statements of value enclosed. The business in money transmission included 172 million despatches, the total sum transmitted in valuables and money amounting to 29.3 milliard marks.

In the year 1902 a total number of 103 postal despatches per head of population were transmitted in Germany, made up of 52 letters and post-cards, 44 "printed matters, communications, newspapers and samples," 3 postal money-orders, and nearly 4 packages, &c., containing valuables.

The total number of persons travelling in postal conveyances was 3 millions.



Telegraphs.

The second great means of communication, the telegraph, although an invention of the latter half of the nineteenth century, is to-day scarcely of less import-

ance than the postal system. There was in 1902 a telegraph-office to every 20.3 sq.-kms or every 2,114 inhabitants. The lines measured 134,000 kms, with 496,000 kms of wires. The number of telegrams sent by the 26,700 telegraph-offices was 45.2 million, 32.1 million being sent within the Empire itself, making an average of 80 telegrams per 100 inhabitants.



Telephone.

During the last two years a third means of communication, the telephone, has likewise developed to quite an extraordinary extent. At the end of 1902 there

were 67,000 kms of municipal lines with a total length of cable mains amounting to 1,088,000 kms, and distributed among 18,610 places. The telephone connections measured 358,000 kms in length. There were 393,000 call-stations (4,000 of them public ones) and the number of conversations in the year was 843 million, 112 million conversations being exchanged between call-offices of different places.

The postal district of Berlin remains the greatest telephone centre of the world. It has over 65,000 call-offices and 209,000 kms of connection mains. In 1902 the number of conversations exchanged daily, was 433,000.

Within the Imperial Postal district there was 1 call-office to every 27.4 sq.-kms and every 2,952 inhabitants. In 1900, 632 places abroad were connected with Germany by telephone. The largest direct cable main is the Paris-Berlin line, which was completed in 1899 and measures 1,150 kms. This also transmits the telephone communication between Berlin and Bordeaux, a distance of 1,750 kms.



German Post-Offices in the German protectorates and abroad.

In the German Protectorates beyond the seas, and in Constantinople, Beyrout, Jaffa, Jerusalem, Smyrna, Tangiers, Shanghai, Hankau, Peking, Tientsin, Tongku, Choofoo, Shanghaikwan, Weihsin, Tsingkiang, Amoy, Canton (since 1903 also in Nanking), and a number

of postal agency establishments, there were at the end of 1902 altogether 108 German post-offices and 27 telegraph-stations.

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German submarine cables.

Among the German telegraph lines, the submarine cables are worthy of special notice. With the exception of several lines communicating with the islands in the

North Sea and the Baltic, measuring altogether 570 kms in length, they serve exclusively for the purposes of international communication. 7 cables, with a total length of 2,205 kms, are the property of the Imperial Post-Office, 2 of which, with a length of 1,158 kms, are in East Asia. An eighth cable, the Greet-siel-Valentia line, is not in use. There are 6 other cables which Germany owns in common with other countries. Germany's share in these, measures 937 kms in length. In addition to these there are 5 private cables which are worked by the Imperial Post-Office. Their total length is 10,628 kms, and they include the Borkum-Vigo line, the property of the German (Darine Telegraph Company, measuring 2,065 kms, and the Borkum-Horta-New York line of the German Atlantic Telegraph Company measuring 7,674 kms. The latter company is at present laying a second cable between Borkum and New York, and further lines for forming connections with transmarine possessions are already planned.



Official Staff.

In 1902 an official staff of 240,000 persons was required to carry on the work of the entire postal, telegraph and telephone system of Germany. This number

was composed of 98,000 officials, 106,000 subordinate officials and 36,000 assistants. The number of female clerks employed is on the increase; in 1902 12,400 females were employed in the Imperial Post, 9,700 having the position of officials. Among the 6,551 officials employed in the telephone service, as many as 5,725 were females.



Revenue and Expenditure.



Social significance of the Post-Office.

The total revenue of the Postal, Telegraph and Telephone systems amounted in 1902 to 4946 million marks, and the expenditure to 4445 million marks.

A special public task has been assigned to the Post-Office by the legislative provisions for the protection of the working classes. The Post-Office sells insurance

stamps for old age pensions and pensions for persons incapacitated for work. It also pays the sick, accident, old age, and incapacity pensions. In 1902 the Imperial Post-Office sold 420 million insurance stamps amounting in value to 112 million marks. It paid:

Class of payments	Amounts paid in millions of marks	1,000 persons re- ceiving payment	1,000 payments
Accident insurance Pensions for persons incapa-	90-7	792	5,323
citated for work	65-3	534	5,373
Old age pensions	20-9	170	1,878
Sick annuities	1.3	14	97
Subscriptions refunded	6.3	165	330
Total	184-5	1,675	13,001

B. Railways.

1. Full-gauge Lines.

Railway system.

At the end of the financial year of 1902 the full-gauge lines of the German Railways measured a length of 52,004 kms. Dore than a third of the system

(18.580 kms) consisted of two or more tracks. More than three-fifths (32,718 kms) were main lines, almost exclusively the property of the Government, only 1,260 kms being private property.*) Of the 19,287 kms of branch lines, by far the greater part is State property, only 3,334 kms belonging to private concerns.**) Consequently, more than nine-tenths (91.2 per cent) of the full-gauge lines are the property of the State. The greatest railway system in Germany under one management is the Prussian-Hessian State Railway: its total length of track measures 31,998 kms. The Bavarian State Railway has 5,916 kms of track, the Saxon State Railway 2,668 kms, the Wurtemberg 1,803 kms, the Imperial Railway system in Alsace-Lorraine 1.670 kms. and the Baden State Railway 1.655 kms.

The total length of track was made up of 70.943 kms of "through" lines and 26,936 kms of shunting lines, sidings, &c.

The network of German railways grows annually by about 2 per cent. which increase is almost entirely due to the building of branch lines, the system of main lines being complete.

In 1901 there were 94-4 kms of railway in Germany to every 1,000 sq.-kms of country, and 89-8 kms to every 100,000 inhabitants. As far as larger areas are concerned, the network of lines is most dense in the Kingdom of Saxonv, which has 163.8 kms of line to every 1.000 sq.-kms, in Rhineland, which has 139.8 kms, and in Westphalia, which has 129.8 kms. In the principal industrial district of Germany, that of Ruhr, the length of line per 1,000 sq.-kms amounts even to 346 kms. The railways are fewest in East Prussia with 62.7 kms to every 1,000 sq.-kms, in Pomerania, with 63.6 kms, and in West Prussia, with 65.5 kms.

Invested capital and cost of working.

In 1902 the capital invested in main and branch lines amounted to 13.46 milliard marks, or 259,000 marks per km. The cost of maintenance, repairs and exten-

sions throughout the whole system, including telegraphs, amounted to 243 million marks. At the end of 1902 there were 20,296 locomotives in use, and the rolling stock numbered 41,259 passenger cars, 424,019 luggage cars and trucks. Of the passenger cars, 10 had six axles, 3,033 four axles, 11,507 three axles, and 26,709 two axles, whilst of the freight cars 4,628 had four axles, 6,245 three axles, and 413,146 two axles. In addition to this there were 2,332 post-office cars in use. The passenger cars could seat 1,892,000 persons, i. e., 54,000 in the first class, 291,000 in the second class, 1,122,000 in the

*) 483 kms of private line was transferred to the Prussian Hessian Railway Company in 1903. 151

**) 257 kms of branch line was transferred in 1903 to the State of Prussia.

third class and 426,000 in the fourth class. The total load carried by the goods wagons amounted to 5,287 million tons, or 6.12 tons per axle.

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Passengers and goods carried.

The number of passengers conveyed amounted to 891 million persons; there were 1 million tons of luggage, and 366 million tons of freight. The average payment

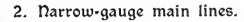
paid by each passenger per km was 2.69 pfennig; the rate paid for every ton of freight per km 3.68 pfennig. Each passenger was carried an average distance of 23.7 kms, and every ton of freight 100.1 kms. The total number of kilometers travelled by all passengers amounted to 21,092 million, and that traversed by freight (if reduced to 1 ton) was 36,687 million. The prime cost of the rolling stock amounted to 2,572 million marks, and its maintenance



Rentability.

during 1902 to 188 million marks. The receipts totalled 2,025 million marks, and the expenditure 1,311 million marks, leaving a surplus of 714 million marks, or 5.4 per

cent on the invested capital. The total number of workmen and officials employed was 545,000.





Narrow-gauge lines. In addition to the full-gauge lines, there are a further 1,879 kms of narrow-gauge track in public use. 849 kms were the property of the State, and 1,030 kms private

property. The receipts from these lines amounted to 10.3 million marks, and the expenditure to 8.7 million marks. This made the interest on the invested capital of 120 million marks (69,000 marks per km) only 1.4 per cent. In 1902, 23 million passengers and 7.2 million tons of goods were conveyed on these lines.



"Small" railways.

An important part is played in Prussia by the local tertiary railways which are termed "small railways" (Kleinbahnen), in the Act of July 28th 1892. At the

end of 1901 they comprised 3,000 kms of street railways, and 5,700 kms of "small railways" resembling the above-mentioned branch lines.*) Amongst the Tramway concerns of Germany, the "Great Berlin Tramway Company," is worthy of special notice. Apart from the three suburban systems which it controls, its lines measure in all 237 kms, and its cars number 2,574, with a seating capacity for 83,500 passengers. The number of passengers carried during the year 1901 was 277 million. By far the greater number of German street railways are driven by electricity, only 3.3 per cent of the total length of line being used in 1901 for horse cars, and 5.9 per cent for steam cars. On the other hand, only 4 per cent of the small branch lines are driven by electricity, the remainder being driven by steam. Three-fifths are under the direction of large establishments which control a number of separate undertakings on uniform principles. One Berlin firm alone has a network of lines measuring over 2,200 kms under its control. As many as 34 per cent (1,952 kms) of the local small lines are the property of municipalities, and nearly half are run by them.

*) Outside Prussia the "small railways" are for the most part included in the system of larger lines under the head of "branch lines."

C. Inland navigation.

The inland water traffic of Germany has increased enormously of late years. Transport by water is for the most part carried on by means of the large natural rivers and steams, but latterly, owing to the rapid increase of traffic, it has been found necessary to employ artificial assistance in the shape of canals and cuttings.

Waterways.

The length of the German waterways navigable for traffic, including the river mouths, measures 14,400 kms. This includes 9,300 kms of natural rivers. 2,470 kms

of streams made navigable, and 2,470 kms of canals for barges. Besides this there are the "North Sea and Baltic" (Kaiser-Wilhelm) Canal 100 kms in length, and the Königsberg-Pillau Sea Canal measuring 32 kms in length. 2,400 kms of this system of waterway were navigable for boats of 1.75 meters draught, a further 3,100 kms for boats drawing 1.50 meters, and 7,100 kms for boats drawing 1 meter, while 1,800 kms were only navigable for boats drawing less than 1 meter.

Goods traffic on the waterways.

As far as freight traffic is concerned, there are really only 10,000 kms of inland waterways that come under consideration. The freight transported over this distance

amounted in 1900 to 46.2 million tons; 26 million tons were for inland traffic, 14.4 million tons came from abroad, and 5.8 million tons were exports.

Four-fifths of the traffic fell to the share of the 7 principal rivers of Germany, whose total length is about 3,000 kms. The figures for each are as follows:

	Length in kilometers	Million kms tra- versed if reduced to one ton	1,000 tons of goods per km
Memel	161	88	550
Weichsel	239	159	670
	650	1,042	1,600
Elbe	621	2,605	4,200
Weser	366	128	350
Rhine	570	5,292	9,290
	384	34	90
Total	3,000	9,350	3,125
	10,000	11,500	1,150
	49,600	36,900	740

The goods traffic upon these waterways shows a very considerable development as compared with the railway traffic, for in 1900, 24 per cent of the total goods traffic within the Empire was effected by means of waterways and 76 per cent by railways. The annual amount of traffic over every kilometer of waterway was 1,150,000 tons (in the case of the 7 principal rivers as much as 3,125,000 tons) and over the kilometer of railway it was 740,000 tons.

The following are the ports which show the largest traffic returns:

	Arrived	Left	Total
	1,000 tons		
Ruhrort, Duisburg and district	5,485 6,047 5,902 2,526	8,867 1,060 735 3,175	14,352 7,107 6,637 5,701

Some distance behind comes Stettin with a river traffic of about 2.419 million tons; then Magdeburg with 1.995 million tons, Mayence, Kastell and Gustavsburg, Frankfort-on-the-Main and Breslau.

Vessels.

At the end of 1902 the number of German vessels for inland navigation amounted to 24,681, with a total capacity of 4.8 million tons. These included 2.743

vessels with a capacity of less than 20 tons, 8.018 with a capacity of between 20 and 100 tons, 8.525 with a capacity of between 100 and 300 tons and 4.506 with a capacity of more than 300 tons.

There were 22.079 sailing vessels with a total capacity of 4.6 million tons, Engine, driven vessels (steam, petroleum, benzine, gas, electricity) numbered 2.602, with 144,000 tons capacity.

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Navigation on the Rhine.

More precise figures can be given for the Rhine. In 1901 there were 1·123 steamers and 8·379 sailing vessels. Among the former 9 per cent served exclusively, and

6 per cent partially for passenger traffic, 14 per cent only for goods traffic and 66 per cent for towing. The greatest transport capacity of a single freight steamer was 975 tons (and in the case of the sea-going steamers, not included here, 1,770 tons). The remaining vessels serving for freight transport have an average capacity of 326 tons. The largest carry more than 3,000 tons and draw 2.75 ms of water.

70 per cent of the h.p. of the steamers plying on the Rhine belonged to Germany, but in the case of sailing vessels and towed barges only 50 per cent of their loading capacity were under the German flag, 37 being Dutch, and 13 Belgian, etc. Vessels belonging to foreign nations also ply on other German rivers, but not nearly to the same extent.

XIII. Shipping.

The present highly developed condition of German shipping practically extends back only to the year 1870. The maritime trade of certain towns, such as Hamburg and Bremen, had, it is true always been of importance, but the actual shipping business carried on was only limited. Foreign flags

predominated in their harbours. Their ship-building yards turned out comparatively few ships, and the share which they had in deep sea fishing was very small indeed. Up to the year 1867 one of the most important conditions for any great activity in this direction was lacking; previous to that year there existed no flag common to the whole of Germany, and consequently no unity in Germany's maritime interests. It is only since the foundation of the North German Federation and of the German Empire that this state of affairs has altered. There are no comprehensive figures forthcoming to show the development of the industry until the year 1872/73.

A. Harbour Buildings and River Regulation.

The great technical progress in dredging and deep level working enabled

Germany to overcome the difficulty experienced by ships in approaching her shores and river mouths. Since the beginning of the eighties and since Hamburg and Bremen joined the Customs Union (Zollverein), large modern harbours have been constructed on the Elbe and Weser, with enormous basins, quays, sheds and store-houses and practical means of transport between ships and railways. Since 1887 Hamburg has at different times been obliged to add three large new harbours to those already existing. and new basins have also been constructed at Bremerhaven and Cuxhaven. During the same period Bremen more than doubled its harbours and quays. The advantages which the Northern ports gained by joining the Customs Union resulted in the opening of the Kaiser Wilhelm Canal which threw these of the Baltic open to trade. This again gave an impetus to trade which led to the deepening of the Trave and to the building of a harbour at Lübeck as well as the construction of the Elbe-Trave Canal. The river Oder has been buoved, channelled and regulated, and Stettin and its mouths supplied with a free harbour district of modern construction. The same has been done at Neufahrwasser for Danzig at the mouth of the river Weichsel, and the Haff Canal, a waterway of 7 ms in depth, has given to Königsberg the most modern harbour devices. Emden too has constructed a modern port with a depth of over 9 ms and a free district. The Dortmund-Ems Canal which provides a direct connection by water with the Westphalian Industrial regions must also be mentioned. In addition to the above-mentioned expenditure amounting altogether to over 1,000 million marks, the construction of the various inland navigation canals which are at present projected must also be touched on. They comprise canals connecting the east and west, the deepening of the upper Weser, the Ems-Jade Canal, the canal for heavy shipping between Berlin and Stettin, the channelling of the upper Oder, the eastern canals, the construction of the Masovian Canal, &c. In short the problems in connection with harbour and canal construction are ones which have taxed the technical skill of high and low-level engineering to the utmost, and which have been solved or are shortly to be solved with the most brilliant success, either by the State or by private German enterprise.

B. Maritime Traffic.

The following are the figures for the maritime traffic in German ports for the year 1901:

	·	Arri	ved			Le	ft °		
	To	tal	1	last or ipty	To	tal	In ballast or empty		
	1,000 Vessels	Registd. tonn. in 1,000 ts	1,000 Vessels	Registd. tonn. in 1,000 ts	1,000 Vessels	Registd. tonn. in 1,000 ts	1,000 Vessels	Registd. tonn. in 1,000 ts	
Total number of vessels Steamers inclu-	89-4	19,169	10.8	1,494	89.7	19,133	25.2	6,090	
ded in above	49-4	16,401	2.0	1,044	49.3	16,333	10.2	5,055	
		Came	from			Left	for		
German ports. Other European	54.3	4,410	8.6	852	54.6	4,399	9.5	868	
ports Non European	32.8	9,409	2.2	626	33.3	10,280	15·5	4,907	
ports	2.3	5,349	2.65	15	1.8	4,454	0.5	315	

The proportion of German shipping carried on under the German flag has considerably increased, particularly within the last 10 years, in consequence of the institution of regular shipping routes and lines to all parts of the globe.

	18	391	1901				
Vessels engaged in traffic	Number	Tonnage	Number	Tonnage			
	per cent						
German ships	72.8	51.9	76.5	59-4			
Foreign ships	27.2	48-1	23.5	40.6			
British ships included in above	8.2	30.7	5.7	22.0			

As this table shows, the increase in the number of German vessels has been chiefly at the expense of the British ones.

- If a registered ton is reckoned as equal to a ton weight, the quantity of goods carried works out as follows:—freight arriving, about 18 million tons; freight leaving, about 13 million tons; total, 27 million tons.*)
- *) Since the traffic in goods between German ports is reckoned both in leaving and arriving, in order to ascertain the total amount of traffic it ought only to be reckoned once. Hence the difference between the figure for the total amount of traffic and the sum of arrivals and departures. The figures are, however, only given approximately in round numbers, since it is not possible to obtain quite accurate statistics for the total amount of traffic.

It must be borne in mind that a large proportion of German maritime traffic is carried from foreign ports, in consequence of the geographical position of the country as has already been pointed out and cannot therefore be calculated numerically.

C. Freights.

It is estimated that Germany had in 1800 a maritime traffic of 200,000 registered tons, in 1867, 700,000; in 1871 Germany owned 150 steamers with a capacity of 82,000 register tons and 4,350 sailing vessels with a registered tonnage of 900,000. Assuming a steamship ton to be equivalent to 3 sailing vessel tons, this would result in a capacity of transport equal to 1,146,000 registered sailing ship tons. On January 1st 1902, the position was as follows:

	Number	Thousand	Crew	
	Trumbet	gross	net	Crew
Steam ships	1,463	2,446	1,506	40,411
Towed vessels (or lighters)	260	84	80	906
Sailing vessels	2,236	550	507	12,629
Total number of vessels	3,959	3,081	2,093	53,946

The transport capacity, now that a net steamship ton according to the altered circumstances in shipbuilding is equal to 4 sailing ship tons, amounted to 6.6 million sailing ship tons, or almost 6 times as much as 30 years ago.

The freight-carrying centers of Germany lie to-day entirely on the North Sea. The following table shows the ports to which the various vessels belong:

	Han	iburg	Bre	men	Baltic ports	
	Number	1,000 reg. tons, gross	Number	1,000 reg. tons, gross	Number	1,000 reg. tons, gross
Sailing vessels	348	223	141	178	361	26
Sea-going lighters	102	36	125	42	15	3
Steam-ships	529	1,348	329	699	451	327
Total	979	1,607	595	919	827	356
Per cent .	24·7	52·2	15·0	29·8	20·9	11 ⁻ 6

These figures show that no less than two-fifths (39.7 per cent) of the total number of ships, and over four-fifths (82 per cent) of the total loading capacity of the German commercial navy fell to the share of Hamburg and Bremen alone. The Baltic ports on the other hand now claim no more than a fifth (20.9 per cent) of the number, and a ninth of the loading capacity of the commercial fleet.

At one time freighting was carried on almost entirely by small establishments, but the tendency towards larger and giant concerns is to-day strongly in evidence. In 1886 Hamburg had only 4 large steam navigation companies, while in 1902 there were as many as 8 freighting companies with a fleet of over 50,000 tons, four of them over 100,000 tons, the Hamburg America Line with 620,000 tons being by far the largest. In 1902 Bremen had two freight fleets with over 100,000 tons, one being the North German Lloyd with over 500,000 tons.

The means at the disposed of the 6 largest German Joint Stock Shipping Companies, which control altogether more than half of the German merchant navy, amounted in 1902 to a nominal share-capital of 2491/4 million marks and 112·3 million marks in preference debentures. The total value of German capital invested in shipping amounted to about 650 million marks. The annual receipts from freight and passenger transport of the German shipping firms are estimated at between 350 and 400 million marks.

The relatively short average age of the German merchant ships vouches for their high efficiency. The average age per gross register-ton of the sailing vessels was, at the beginning of 1902, about 17 years, that of the lighters about 9.1 years, and of the steam-ships 8.1 years, making an average for all sea-going ships of about 9.7 years.

The average size of the sailing vessels amounted to 246 gross register tons, of the sea-going lighters 322, and of the steam-ships 1,673, making an average for all vessels 779 gross register tons. There are at present 25 steamers with a lading capacity of over 10,000 tons, 12 of them carrying more than 12,000 register tons. 4 of these steamers possessed the high average speed of 22.5–23.5 nautical miles an hour. The record for transport capacity among sailing vessels is held by the five masted full-rigged ship "Preussen" with a hold capacity of 5,081 gross register tons and a tonnage of 8,500 (equal to 850 railway trucks of 10 tons each).

D. Ship-building.

Germany possesses 42 dock yards on the coast, 26 of which are for the construction of middle sized and larger sailing vessels, 13 on the Baltic and 13 on the North Sea. Three of this number are Imperial yards for the construction exclusively of warships, 5 or 6 are private yards adopted at present for the construction of warships and high speed steam-ships; 2 or 3 are capable of development in this respect, while 4 or 5 others serve exclusively for the construction of large and middle sized cargo and passenger steamers. The remainder are occupied in building smaller vessels.

These dockyards, apart from the Imperial yards, command a capital of about 110 million marks. 25 of the above-mentioned yards employed in 1899 more than 50,000 hands, and required for their works roughly 18,000 h.p., 136 dynamos, 572 electric and 51 other motors, 9,725 machines and 1,261 cranes with a total lifting capacity of about 9,000 tons. 43 of the 136 existing

ships were over 100 ms, and 17 were over 150 ms long. At the present moment there are about 25 slips for the construction of vessels of over 10,000 register tons.

For the purpose of repairs there are large docking arrangements in the fortified harbours, a dry dock of enormous dimensions at the mouth of the Weser, large floating docks on the Elbe and Oder and numerous slips. Smaller floating and dry docks are found at all seaports.

Up to the commencement of the nineties, Germany obtained more than two-thirds of her ships from abroad, principally from England. During the years 1900—1903 the average annual proportion supplied from abroad was only 28 per cent, while at the same time she built a number of ships for foreign countries which corresponded to 11.6 per cent of her own requirements.

In 1901 Germany turned out 230 steam-ships with a gross register tonnage of 261,000, and 211 sailing vessels with 30,700 gross register tonnage. In 1902 she built 227 steam-ships with 212,000 gross register tonnage and 280 sailing vessels with 58,700 gross register tonnage.

The following table shows the statistics for 1902:

	S	team-ships	Sa	iling vessels
	Num- ber	Gross register- ed tonnage	Num- ber	Gross register- ed tonnage
Sea-going vessels of over 100 register tons	55	161,800	13	11,500
gister tons	— 40	 6,800	33 154	1,900 25,700
Special vessels (tugs, ice breakers, dredgers, &c.)	121 11	17,000 26,700	80	19,600
Total	227	212,300	280	58,700
Built for foreign countries Built for the German Empire abroad	25 19	26,100 46,000	10 25	1,300 11,800

At the end of 1902 there were 121 steam-ships with a registered tonnage of 256,000 and 114 sailing vessels with a registered tonnage of 22,300 lying in German ship-yards in course of construction. These included 18 warships with 67,700 registered tons, 50 sea-going steam-ships, with 177,400 registered tons, 15 sea-going sailing vessels with 8,000 registered tons; while 13 sea-going vessels with a registered tonnage of 18,400 were being built abroad for the German Empire.

6 E. Institutions for the furtherance of Maritime Matters.

A number of important institutions have been started in Germany by the initiative of the State and of private individuals for the promotion of German maritime traffic and maritime affairs in general. Such institutions are the Nautical department of the Imperial Naval Office, the German maritime Observatory, the Institute for Maritime knowledge, the Naval Museum in Berlin, the departments for aquatic and marine construction at the Technical Colleges, Navigation Schools and Marine Engineering Colleges, the Fishery Schools and the organized nautical education of the youth of Germany by means of three training ships. The founding of the great inspecting body, the German Lloyd, was of the greatest importance. The three elaborately furnished testing stations for towing purposes at the Berlin Technical College, the North German Lloyd establishment at Bremerhauen and the "Kette" Company in Uebigau, serve for practical experiments of marine architects. Great activity has been shown by such private associations as the German Nautical Society and the German Sea Shipping Society, as well as by the professional representative associations of shippers and ship-builders, and of wharf and dock hands. The German Union for saving shipwrecked people has been a great blessing. The development of vachting has served to encourage enthusiasm for the sea while forming a source of amusement. The principal clubs are the Imperial yacht Club, the North German Regatta Club, and, of late years, the "Seefahrt" Club at Hamburg. A Society for the Promotion of the Technics of Ship-building was founded at the commencement of the present century and counts many professional men among its numbers. The fact of His Majesty having consented to become its patron proves to the world what importance Germany attaches to the development of the practical and scientific interests of ship-building.

XIV. Bullion and Credit, Stocks and Shares, Stock Exchange and Savings-banks.

A. Bullion.

Coinage.

The total value of coins of the Empire struck in accordance with the Acts dated December 4th 1871 and July 9th 1873, April 1st 1886 and June 1st 1900 to amend the Act of

July 9th 1873, from the founding of the Empire up to the end of the financial year 1902/03, was 4,674 million marks. Of this amount, however, 89.7 million marks' worth had been withdrawn from circulation at the end of March 1903. The total amount in circulation at the end of March 1903 was made up of gold pieces amounting to 3,876.4 million marks, silver amounting to 621.9 million marks, nickel amounting to 70.3 million marks and copper amounting to 15.9 million marks. Besides the coinage of the Empire, the German "thaler" still passes as legal tender. The gradual withdrawal of these pieces from circulation was, however, decided upon by the Mint Act dated June 1st 1900, so that in about 10 years Germany will have a "pure gold" instead of an "imperfect" standard.



Paper money.

In addition to the mentioned specie there are 6,900,000 Imperial Bank notes of 5, 20 and 50 marks' value in circulation, amounting in all to 120 million marks.

Besides this there were in 1902—apart from 2.2 million marks worth of Brunswick notes, and notes of the provincial bank in Bautzen amounting to about 3 million marks, which were only current in a limited radius—notes issued throughout the Empire by the five authorized banks amounting to 1,371.2 million marks, made up of 100, 500, and 1,000 mark notes. Of this sum about 265.2 million marks' worth were in excess of the actual deposits of coin and bullion.

The amounts of legal tender in circulation for several years are given below, the totals being reckoned in millions of marks.

				Coin	s of t	he Em	pire		. <u>-</u>	
Уear	Gold amour in colum		centage of amount Silver in column 10		Per- centage of amount Nickel in column		Copper	of amount in	centage Total amounts of columns column 2,4,6,8	
1	2	3	4	5	6	7	8	9	10	11
1880 1890 1900 1901 1902	1,746·6 2,527·5 3,687·2 3,796·2 3,876·5	78·73 83·21 85·47 85·20 84·56	427·1 452·2 543·7 574·2 621·9	19·25 14·89 12·60 12·89 13·56	35·2 46·2 68·0 69·3 70·3	1·59 1·52 1·57 1·56 1·53	9·6 11·4 15·7 15·8 15·9	0·43 0·38 0·36 0·35 0·35	2,218·5 3,037·3 4,314·6 4,455·5 4,584·6	100 100 100
3	Thalers	Imp. Bank- notes	Ba	nk-notes	;		Total	legal te	nder	
Year	77.4.1					T. 1. 1 5		Percen	itages	
	Total sum esti- mated	Total sum	Total	71ncc. Per-		Total of columns 10, 12, 13, 14	Coins of the Empire	Thalers	lm- perial Bank- notes	Bank- notes
1	12	13	14	15	16	17	18	19	20	21
1880 1890 1900 1901 1902	475 450 360*) 330 300	159·4 122·9 120·0 120·0 120·0	1,007·7 1,197·0 1,313·9 1,345·4 1,373·4	392·3 276·8 362·3 294·4 266·7	38·93 23·12 27·57 21·88 19·42	3,860 ⁻⁶ 4,807 ⁻² 6,108 ⁻⁵ 6,250 ⁻⁹ 6,378 ⁻⁰	57·46 63·18 70·63 71·21 71·88	12·30 9·36 5·89 5·28 4·70	4·13 2·56 1·96 1·92 1·88	26·10 24·90 21·51 21·52 21·53

^{*)} This great fall is due to the fact that with the continual increase of population of the German Empire a large proportion of thalers is being re-minted into coins of the Empire.

B. The Imperial Bank, and Banking generally.



Banking.

German banking may be divided into two groups,—the Imperial Bank and its branches, and the private joint stock banking establishments with theirs. Both these

have made Berlin an authoritative financial centre.



Institution of the Imperial Bank.

The former commenced its career on January 1st, 1876, in succession to the Prussian Bank, after an agreement between Prussia and the German Empire had been

signed on 17th/18th May, 1875 (provided for in the Bank Act of March 14th, 1875), referring to the transfer of the Prussian Bank. The original capital of the new bank amounted to 120 million marks. By the



Capital of the Imperial Bank. the new bank amounted to 120 million marks. By the Act dated June 7th 1899 to amend the Bank Act, this capital was increased to 150 million marks on January 1st 2000, shares at 1,000 marks each. A further increase

1901 by the issue of 30,000 shares at 1,000 marks each. A further increase of capital to 180 million marks is looked forward to for January 1st 1905. The reserve funds on January 1st 1903 amounted to 47.5 million marks, and are to be increased to one-third of the original capital.



Branch establishments of the Imperial Bank. On January 1st 1903 the Imperial Bank had under its direction the principal bank in Berlin, 18 chief branches, 61 smaller branches, 272 subordinate branches with counting-houses, 12 subordinate branches without

counting-houses and 12 store-houses, making a total of 376 establishments as against 359 on January 1st 1902. The following table shows the development of the branch establishments during periods of 5 years.

At the	1	idepender ablishme	,			Totals			
begin- ning of the year	Chief bran- ches of the Imp. Bank	Smaller bran- ches of lmp. Bank	Totals of columns 2 and 3	Larger subor- dinate bran- ches of lmp. Bank	Subordinate branches of Imp. Bank with without count house house		nouses	Totals of columns 5–8	of columns 4 and 9
1	2	3	4	5	6	7	8	9	10
1876 1881 1886 1891 1896 1901	8 17 17 17 17	44 43 44 45 47 58	52 60 61 62 64 75	4 2 2 1 1	111 115 137 177 228	9 20 19 17 13 13	27 28 22 25 20 14	130 161 158 180 211 255	182 221 219 242 275 330
1902 1903	18 18	61	79 79	_ 	253 272	12 12	14 12	279 296	358 375

lt is evident that, the Imperial Bank is continously adhering to its purpose of serving as a back-bone to the whole system of payments throughout

the country, and of uniformly effecting the equalisation of the system everywhere by its continually increasing extension to the smallest places. It is interesting to note that the almost uninterrupted increase in the total of branch establishments attained a quite unusual height in the period 1896 to 1901. At the same time the multiplication of the subordinate branches of the Imperial Bank which have counting-houses is also to be noted. As far as their business with the public is concerned they correspond to the independent establishments, and only differ in their organisation.

The amount of business transacted by these establishments is shown in

the following table:

Comparative summary of business transacted by the Imperial Bank since its foundation.

1						Sums in	mi	llions	of	marks		······································		
	Periods		Total turnove	r	Puro Local bills	chase of provin- cial bills	Fo	s reign oills	£	oans	Gold pur- chased		Deposit- account	
1	1		2		3	4		5		6		7		8
	1876-1880 1881-1885 1886-1890 1891-1895 1896-1900 1901 1902		45,626 63,950 89,809 111,492 161,145 193,147 191,926	2 2 3 8 6	1,078·1 1,138·0 1,430·1 1,882·1 2,873·3 3,276·6 3,068·8	2,553·1 2,622·2 2,868·3 3,217·0 4,496·8 5,303·4 4,368·7	1 1	34·6 53·2 70·4 64·1 06·5 69·0 80·4	1,0 1,1	590·7 331·3 907·2 021·1 514·2 514·8 499·8	1 1 1 1	90·2 71·4 27·7 34·2 02·0 39·0 29·2	1 1:	27,333·9 44,785·5 67,064·7 83,947·7 17,928·1 36,288·7 35,468·6
	Periods	and	Received and paid out to the iccount of he Empire and Federal States 10 Page 1		Pominal palue of pers and cuments anded to pers ank be taken parge of d supervised 2)	Total amound dealt w at the different clearin houses	ith it g	Cost admi strati	ni-	Net prof		Adde to reser fund	ve	Divi- dends per cent decla- red ⁴]
	1		9		10	11		12		13		14		15
	1876-1880	1	,821 ⁻ 9		664	 (8,887 ⁻ !	5 5] \	5.4	ŀ	9.7	7	0.4	3	5.94
	1881-1885	2	2,119-1		1,245.2	12,130·1 (12,554·2	6j	5-7	7	11:3	3	1.	1	6.49
	1886-1890 1891-1895 1896-1900 1901 1902	4 19 31	3,219·3 4,290·8 9,626·5 ,448·4 5,758·7		1,902·2 2,558·3 2,821·4 2,975·9 3,029·3	15,823 18,476 26,957 28,922 29,969	7 3 3	6·6 8·7 11·1 13·7 14·1	7	12.0 13.9 24.9 25.9 19.9	9	1·3 0·9) ⁸) 5 ⁹)	6·54 6·72 9·07 6·25 5·47

As can be seen from the above tables the Imperial Bank has made enormous strides. In 1876 the total turnover amounted to 36,7 milliard marks; in 1902 it reached 1919 milliards, that is to say, in 27 years it increased by more than five times. The years from 1896 to 1900, in particular, show a rapid increase in all branches of the business compared with former years, an increase corresponding to the tension of all the economic forces of Germany taking place during that period. The one exception was in the purchase of gold. The amount of business done in this direction is not so much dependent upon economic conditions as upon international banking relations, the standard of value at the time, and the position of the money market. The circumstance that in spite of the existing crisis in banking circles the bank's business increased further in 1901 is due to the great reluctance to making advances shown by the other credit-advancing establishments, which had became very cautious on account of the collapse of certain large undertakings.

The total turnover since 1896 at the central office in Berlin and the principal branch banks was as follows:

Year	Berlin	Hamburg	Frankfort, (I).	Cologne	Leipsic	Breslau
1896	44,852·7	13,852·8	8,958·8	3,292·3	3,964·5	3,560·6
1900	59,904·2	16,375·5	10,742·2	6,492·1	4,927·4	6,810·6
1901	63,781·4	15,713·5	10,598·7	6,373·8	4,969·9	5,473·1
1902	67,087·5	15,502·9	10,296·3	6,091·4	5,363·0	4,998·6

Circulation of notes.

The Bank Act of 1876 permitted a circulation of unsecured notes not subject to taxation up to the value of 385 million marks. Of this sum 250 million marks'

- The enormous increase of receipts and payments is partly explained by the fact that more and more of the Federal States have connected their treasuries with the Imperial Bank.
 - 2) Average quotation at end of year.

3) At the present moment there are 11 clearing houses.

The reduction of dividends was necessitated by a re-distribution of the profits. At the time of the foundation of the bank, for example, the State received 50 per cent of the profits remaining, after deducting the $4^{1}/_{2}$ per cent ordinary dividends for the shareholders and a sum of 20 per cent for transference to the reserve funds, and also 75 per cent of any balance still remaining. To-day the State receives 75 per cent of any balance remaining after paying a dividend of $3^{1}/_{2}$ per cent to the shareholders and transferring a sum of 20 per cent of the balance to the reserve funds.

5) Actual figures reached December 1883.

6) Actual figures for the year 1884.
7) Actual figures for the year 1885.

8) Actual figures for the year 1891, in which the prescribed limit of 30 million marks for the reserve funds was reached. The fact that further additions have been made to the reserve funds since 1901 is owing to the Bank Act of June 7th, 1899.

9) This unusual figure is explained by the fact that the sum of 10,500,000 marks paid on application for shares was placed to the reserve funds in accordance with § 2 of the Act of July 7th, 1899.

worth were issued by the Imperial Bank and the remainder by the other 32 private banks in Germany which are allowed to issue notes. By the year 1899, 25 of these establishments had renounced their rights to issue notes, and their business fell to the Imperial Bank. The Bank Regulations of 1899 raised the limit of notes, free of tax and unsecured, to 541.6 million marks, of which 450 million marks' worth were allotted to the Imperial Bank.

In 1900 and 1901 two banks renounced their rights to issue notes, and the present total of notes issued by the Imperial Bank now amounts to 470 million marks. The average totals of Imperial bank-notes in circulation for the years 1896-1902 were: 1,085.7 million marks in 1897; 1,124.5 million marks in 1898; 1,141.7 million marks in 1899; 1,190.2 million marks in 1901; 1.229.6 million marks in 1902.

Notes issued by private banks.

The five private banks which still issue notes-work with a total original capital of 66 million marks. The percentage of dividends paid were as follows:

			Percentage			
Year	Baden Bank	Bavarian Note Bank	Brunswick Bank	Bank of Saxony in Dresden	Wurtem- berg Note Bank	
1896-1900	611/30	81/2	55/6	71/30	53/4	
1901	5	8	52/3	4	5	
1902	5	7	51/2	5	41/4	

Circulation of notes.

The average value of private bank-notes in circulation in 1902 amounted to 143.8 million marks; of this amount 55.3 million marks' worth were unsecured.

Their remaining daily liabilities amounted to an average sum of 60.2 million With the exception of the Brunswick Bank and marks in the same year.

Business sphere of the Imperial Bank and other note-issuing banks.

the Provincial Bank in Bautzen, these banks have placed themselves under the Bank Act, and are consequently, like the Imperial Bank, subject to the restrictions it imposes on the carrying on of their business. Each of these banks, therefore, can only transact

business of the following nature:—Traffic in Gold and Silver, bills of exchange, loans, certain kinds of promissory notes, receiving and paying out money, buying and selling stocks and shares for clients, receiving money for deposit and current accounts, taking charge of and attending to valuables.

Deposit and stock and share banks.

The other large German banks are on a different footing. They are governed merely by the general provisions of the commercial code, the Stocks Shares and Ex-

change Act, and the Deposits Act of 1896, and have developed a peculiar position in the management of their business, and one which, apart from the issuing of notes, is quite unrestricted. In many cases they include branches of banking which in other countries are kept distinct, such as deposit banks, banks for capitalising commercial enterprises, and stock-broking business. The most important among them, following the example of the Imperial Bank, have established a system of branches and other subordinate connections; they have even founded independent branches in foreign countries, and have become enormous undertakings of the very first importance.

The following joint-stock banks are the most noteworthy both for size and importance. In 1902 there were 122 German deposit and share-issuing banks, each with a share-capital of over a million marks or transacting business amounting to that amount, and showing at the end of the year assets amounting to 7,085 million marks. The increase of capital in 1902 amounted to 441.7 million marks. Their own capital was made up in shares to the value of 1.980 million marks and in reserve funds amounting to 391 million marks (19.7 per cent of the share-capital). Other capital to the extent of 3,380 million marks was entrusted to them by creditors and customers. Upon their files were acceptances to the value of 1,176.5 million Their total liabilities, including their clear profits, amounted to marks. 4,713 million marks, against which there stood at their immediate disposal the sum of 3,398 million marks, (in specie, bills, loans, shares, &c.),—i. e. 72.4 per cent of their total liabilities.—The gross profits of the banks for 1902 amounted to 256.76 million marks. The net profits figured at 156.17 million marks. The average dividend paid upon the share-capital was 6.19 per cent.

The state of the joint stock banks not issuing notes (with an original capital of at least one million marks).

Year	Num- ber	Own capital	Re- serve	Other assets (Credits and deposits)	net profit	able	Gross profit	Net pro- fit	Average percentage of dividends
				π	Dillion mar	ks			
1896 1900 1901 1902	98 118 125 122	4,215 6,958 6,643 7,085	235 391 380 391	1,868 3,128 3,015 3,380	2,739 4,608 4,304 4,713	2,011 3,243 3,157 3,398	159 263 258 257	118 185 153 156	7·66 7·19 5·66 6·19



The development of German banks due to natural conditions and legislation has more recently manifested itself in a tendency towards concentration. This is evi-

dent from the following summary:

^{*)} Such means as cash, bills, deposits, securities, &c., which are generally considered easy of realisation.

	Number possessing at										
	lmperial Bank offices	Banking establishments	Bank branches	Bankers	Bankers branches						
1876 1896 1900 1902	62 254 321 358	97 163 223 230	33 82 190 229	974 1,473 1,489 1,492	2 7 12						

The number of offices of the Imperial Bank increased therefore six times, the number of banks by 237 per cent, their branches by 700 per cent, the number of bankers (including their branches) by only 154 per cent. The development of the figures of the distribution of capital and turnover is still more evident.

Berlin and provincial banks.

Of those of the more important banks whose expansion has been most rapid, ten belong to Berlin; they are followed by twenty-two provincial banks in no way

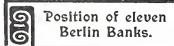
connected with the former as far as concerns organisation; their development however cannot be compared with those of Berlin.

		10 Berlin banks	3	22	provincial ban	ks
	Own capital	Capital be- longing to other persons	Total capital engaged	Own capital	Capital be- longing to other persons	Total capital engaged
			million	marks		
1886 1896 1900 1902	418·8 777·5 1,111·8 1,184·8	502·9 942·8 1,486·4 1,812·9	921·8 1,720·2 2,598·2 2,997·7	114·9 141·0 185·9 191·6	161·2 201·0 278·2 275·7	276·1 342·0 464·2 467·3

Whilst the capital belonging to the Berlin banks therefore almost trebled itself during 17 years, and the amount of the capital entrusted to by them other persons was almost four times as much, the same items in provincial banks only increased by about 66 per cent and 100 per cent respectively.

The growing influence possessed by these ten banks is evident from the fact that they possessed:

	Establishments and branches		Constant parti- cipation in joint stock banks		Total
1896	22	32	2	13	69
1902	40	115	16	14	185



In 1902 there were 11 Berlin banks each with a share-capital of more than 30 million marks, a total nominal share-capital of 995 million marks, and reserve funds

amounting to 235.2 million marks. Their acceptances in circulation amounted to 692 million marks. Their liabilities, inclusive of clear profits, were 2,669 million marks, whilst the assets at their disposal figured at 2,016 million marks, i. e., nearly 76 per cent, making a 4 per cent higher security than for the total of the banks in question. This small number of banks had very great influence in consequence of the enormous means at their disposal, about 1/7 of the total bank capital of Germany and more than 50 per cent of all the capital administered by banks being at their disposal, and their branches being distributed over the whole country. They declared on an average a dividend of 6 per cent, making a total of 65 million marks.



Large provincial banks.

Besides these 11 great Berlin banks there are seven other banks in the Empire each with a capital of at least 30 million marks, and in addition to these the

banks of particular branches of business such as stocks and shares, and in particular two of the largest real-estate banks (one in Munich and the other in Leipsic).



Banks doing brokers' business.

The unsworn brokers who frequent the Stock Exchange as middlemen have combined, partly at any rate, to form a common society with a view to obtaining certain

advantages in effecting transactions of large proportions and increasing their business credit. The most prominent amongst these are the two broker banks in Berlin, which had 38 members in 1902 and a capital each of 3 million marks with a total reserve of 1·2 million marks—and the Hamburg broker Bank, with 56 members and a capital of 1½ million marks. The first two showed profits for 1902 amounting to about 360,000 marks. The turnover in Berlin fell from 3·4 milliard marks in 1893 and 3·7 milliard marks in 1895 to 1·7 milliard marks; in Hamburg it sunk from 0·9 and 0·7 milliard marks respectively to 0·25 milliards.



Clearing business and the Berlin "Kassenverein" Bank For large payments, the most important business is transacted by the clearing and bill-broking department of the Imperial Bank. Besides this, however, the Berlin banks and others make use of a special institution the "Berliner Kassenverein" founded by themselves,

for clearing and collecting bills. The total turnover of this institution for 1902 amounted to 35.9 milliard marks, which sum was equally divided between bill and check transactions, 92.11 per cent of it being settled in the institution itself. The encashment business on acceptances, invoices, and accounts collected for customers reached a total of 13.9 milliard marks. Special liquidation and clearing houses for transactions in stocks and shares also exist in Berlin, Frankfort-on-the-Wain, Hamburg and Breslau.

The clearings of payments within the larger banks themselves,—which are growing constantly in consequence of the rapid spread of separate enterprises throughout the country, through their branches and other affiliated concerns,—cannot be elicited. It is therefore impossible to give a summary of the total transactions in payments within the German Empire.

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Private banks.

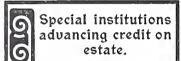
It is just as difficult to estimate in figures the transactions of the German private banking institutions. About a dozen of these latter are little if at all behind

the great joint stock banks in the amount of business done, whilst the smaller private banks are of comparatively less importance, as has been shown but, number nevertheless many hundreds.



German banks abroad. Among German banking establishments a comparatively small fraction are beyond the seas and have been established formed by the four daughter concerns

of the larger Berlin and Hamburg joint stock banks with a total capital of 55 million marks; 11 establishments exist in South America, India, and Eastern Asia, as well as numberless private German banks, some of which are quite independent of home establishments, and which transact their business partly in Germany and partly abroad.



In addition to the banks formed to meet the requirements of floating capital, it is equally interesting to note the development in Germany of institutions the object of which is to procure credit for the proprietors

of non-transferable or real estate. Such institutions are the Mortgage Banks, the Land-mortgage Banks and "Landschaften" (Country banks).



Mortgage banks.

In 1902 there were 39 mortgage banks transacting business in Germany with a share-capital of 640.9 million marks and reserve funds of 242.5 million marks. They

have mortgage bonds in circulation to the value of 7,026 million marks. More than half of these were issued at less than 4 per cent, 3,083 million marks' worth at 4 per cent and only 7.2 million marks at a higher percentage. The total amount of loans made by all these banks amounted in 1902 to 7,440.4 million marks, and consisted almost entirely of town and municipal mortgages and loans, scarcely one-eighth being for mortgages on land. The clear profit of the mortgage business and other branches amounted in 1902 to 63.2 million marks; the sum paid in dividends was 46.3 million marks, making an average of 71/2 per cent.

Development of Mortgage Banks since 1896. (Totals in millions of marks.)

Year	Number of banks	Capital	Reserve funds	Mortgage bonds in circulation	Loans	Net profits	Percentage of average dividends
1896	40	493·7	123·7	5,293·2	5,614·0	63·66	7·96
1900	39	582·6	189·1	6,504·5	6,888·2	63·22	7·67
1901	39	628·9*)	226·6*)	6,715·0	7,100·7	62·16	7·08
1902	39	640·9	242·6	7,026·0	7,440·4	63·2	7·3

^{*)} This great increase is due to the wholesale deferments which were rendered necessary by the crisis in 1900/01.

Up to the year 1899 the lucrativeness of the banking business increased steadily with only one exception. In 1900 certain banks passed through a severe crisis which led in some cases to serious consequences, and a sifting out of unsound institutions. Since 1902, however, the results of this crisis have been to a great extent made good.

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Provincial state credit-advancing institutions.

In addition to the above-mentioned 7 milliard marks in mortgage bonds on town property, comes the further sum of 3 milliard marks mortgages principally on landed estate procured by other credit-advancing in-

stitutions. These are partly old-established concerns of semi officiat character dating back to the 18th century. The 12 credit-advancing institutions of this character which exist to-day, together with the central Prussian provincial institution, serve, with one exception, the interests of the great landed proprietors, and have advanced loans to the value of 21/3 milliard marks. Of a similar nature to these institutions, but operating in a restricted field, is the Berlin municipal mortgage institution, which has mortgage deeds in circulation to a value of more than 200 million marks. There are further 15 other so-called country banks or banks advancing credit on landed estate, and having state, communal or provincial liability, which have advanced a total sum of over 550 million marks in mortgage bonds and more than 235 million marks in corporation loans. Three of these institutions, certainly, procured their working capital through provincial or state debt bonds. The total sum of securities in circulation amounted to about 750 million marks. The remaining capital necessary for the loans advanced was procured principally by the addition of the paid up capital amounting to over 100 million marks.

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Co-operative credit-advancing institutions.

Besides these two principal systems of procuring credit there exist in Germany a number of co-operative societies for advancing loans, principally for agricultural purposes but also for other branches of industry

(see p. 90, &c.).

C. Stocks and Shares.



Statistics of shares, &c.

According to the estimates of the "Deutscher Ökonomist," shares have been issued in Germany to the value of 20–25 milliard marks during the period

1887–1902. One-third of the annual increase of property of the German population, which has been estimated at 6 milliard marks, is to-day laid out in stocks and shares. Roughly speaking about a quarter of the capital property of Germany is employed on the stock exchange. During the last 15 years the amount of German capital invested in foreign loans, exclusive of outlays in banking and industrial shares, was over 6 milliard marks. Between 2/3 and 3/4 of the profits on German capital invested fell to the share of the home moneymarket and inland enterprise, and—apart from municipal and state loans and the mortgage broking business, was invested chiefly in bank and industrial shares.

The demand for foreign shares makes it more difficult to form an idea
as to the amount of capital invested in current foreign loans and undertakings
to-day than formerly, because, since the Stock Exchange Act came into force,
a perpetually increasing percentage of capital invested in foreign shares is
offered on foreign markets. Of the first importance in this respect is the
London Stock market, and then those of Brussels, Amsterdam and New York.
In Germany the following amounts were suscribed for new concerns,
loans, &c.:

Issue of shares during 1896-1902 in million marks, at current rate of exchange.

	Average 18	96-1900	19	01	190	02
	German	Foreign	German	Foreign	German	Foreign
State loans	167.56	186.02	505-57	29.26	536-40	339-00
Municipal loans	166 ⁻ 30	23.77	293.58	12 [.] 86	196-13	61.22
Mortgage deeds	396 ⁻ 55	44.76	210.50	7.16	350-00	6·16
Railway bonds	42.00	170-25	14.81	148-93	8 [.] 71	29.30
Industrial bonds	99-34	10.57	193-23	0.97	158 ⁻ 10	3.20
Railway shares	25 ⁻ 97	21.94	3-02	_	48-01	6.68
Bank shares	260-57	10.86	36.26	9.00	114.33	7.43
Insurance shares	0.70*)	_		_		_
Industrial shares	498-91	15.64	164 ⁻ 28	1.85	184.47	0.51
Total at rate of exchange	1,657-90	484.00	1,421.31	210.03	1,596.15	453.50
Nominal amount	1,407-81	521.64	1,412.73	225.83	1,586-66	481.86

During the years 1896–1900, when the boom was at its highest, an enormous rise took place in the number of shares issued for banking and industrial purposes, accompanied by a corresponding rise in premiums never reached before, an average namely of 67–69 per cent for shares in industrial enterprise, and 40 per cent for banking shares. The commencement of the crisis then made itself distinctly felt. The number of shares issued in 1901 was an unusually small one. In 1902 these was evidence of a decided improvement, as proved by the business results of the banks. In spite of this, however, during the year 1902 banking and industrial shares of a nominal value of about 195 million marks were put on the market at a price of 299 million marks.



Imperial stamps upon securities.

The double and partly contradictory effect of the boom on the one hand and of the new Stock Exchange Act on the other,—serving as it did to make stock exchange

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business more difficult—followed by the increased cost of the Imperial stamp duty and later by the crisis, is to a certain extent reflected in the figures showing the proceeds from Imperial stamp duties on securities.

^{*)} Only issued in 1896 for 3.48 million marks, current rate of exchange.

Proceeds from Imperial stamp duties upon securities.*)

Average of the years	Stock and Share stamps	Stamps on transfers	
	million	marks	
1881/82-1885/86 1886/87-1890/91	4·1 6.5	2.7	
1891/92-1895/96 1896/97-1900/01	7·4 17·5	11·3 13·0 14·0	
1901/02 1902/03	14·5 21·3	13·4 13·6	

A decrease in business transacted is found to go hand in hand with the recent increase in stamp duties.

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Joint-stock companies.

The total number of German joint-stock companies in the middle of 1903 was estimated at over 6,000. For 5,500 companies a paid-up share-capital of 9.8 milliard

marks could be proved, to which 1.5 milliard preference debentures must be added. The reserve funds were on the average estimated at a sixth of the share and debenture capital. 85 companies date back to before 1850, though the activity in founding companies only commenced after the establishment of the Empire. Out of about 4,000 joint-stock companies whose date of foundation could be ascertained, more than 2,500 were started between the years 1890 and 1900.

9

Activity in company-forming.

The activity shown in forming companies during the last few years is divided by the crisis of 1900 into two parts, a boom and a period of quiet. Up to 1900

this activity was directed with great energy to the foundation of new companies, and also, hardly less to the increasing of capitals, and the conversion of separate existing firms and open commercial companies into joint-stock companies. Special establishments similar to the English "Trust-banks" were founded for this latter object in certain industries.

Summary of promotions. [Amount in millions of marks.]

			l number of comotions		Divided amongst							
Year	Number of ioint-	Share-capital		Industry, Building Mining, Agriculture, Cattle, Breeding			Banks					
	stock com- panies	Total	Average for every company	Num- ber	Per- cent- age of col. 2	Capi- tal	Per- cent- age of col. 2	Num- ber	Per- cent- age of col. 2	Capi- tal	Per- cent- age of col. 3	
1	2	3	4	5	6	7	8	9	10	11	12	
1896 1898 1900 1902	172 329 261 87	268·6 463·5 340·4 118·4	1·5 1·4 1·3 1·4	123 248 219 66	71·51 75·38 83·91 75·86	172·6 289·1 282·9 98·7	64·26 62·37 83·11 83·36	13 17 5 2	7·56 5·17 1·92 2·30	37·0 62·6 6·1 2·2	13·78 13·51 1·79 1·86	

^{*)} It must be borne in mind that the stock exchange tax was raised in 1885, 1894 and 1900.

						Divided	amon	gst			-	
V	lns	urance	comp	anies		ailways is of co				Var	ious	
Year	Num- ber	Per- cent- age of col. 2	Capi- tal	Per- cent- age of col. 3	Num- ber	Per- cent- age of col. 2	Capi- tal	Per- cent- age of col. 3	Num- ber	Per- cent- age of col. 2	Capi- tal	Per- cent- age of col. 3
1	13	14	15	16	17	18	19	20	21	22	23	24
1896 1898 1900 1902	1 1 -	0·58 0·30 —	3·3 2·0 —	1·23 0·43 —	17 33 19 10	9·88 10·03 7·28 11·49	37·7 86·4 40·0 9·9	14·04 18·64 11·75 8·36	18 30 18 9	10·47 9·12 6·90 10·34	18·0 23·4 11·4 7·6	6·70 5·05 3·35 6·42

Distribution among the industries.

This activity in the foundation of companies was particularly marked in the building and smelting industries, more than 3/4 of all the new companies formed be-

tween 1896 and 1899 being connected with these branches of industry. The subdivisions within this group in which the development was most noticeable were the branches of metal working and machine construction. six of every thousand companies formed came under this category, and if electrical companies are included, far more than a quarter of the new companies formed will be included in the group. A further sixth fell to the share of the industries for the preparation of food and drink, about 100 breweries alone being founded as joint-stock companies. There was also a spirit of activity strongly in evidence in the quarrying and kindred industries, the textile industry and railway construction. In banking, too, such activity was also prominent, but was less shown in the number of new banks founded as in the amount of capital invested. One-seventh of the total capital invested in newly formed companies was devoted to the metal working industry and machine construction, while the electrical branch alone claimed 50 million marks annually on an average. Railways and other carrying and traffic-forwarding concerns absorbed one-tenth of the total capital invested in shares.

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Spread of jointstock companies. Nearly 9/10ths of the joint-stock companies at present existing are in the industries, the building and smelting businesses. The rest, apart from about 150 Assurance

companies, are divided amongst banks and other credit institutions. The proportions as regards capital are however quite different; fully a third of the capital invested in shares and debentures being engaged in banks and assurance companies.

In 1896 about one-seventh of the existing joint-stock companies had a capital of less than 100,000 marks, and another seventh between 100,000 and 250,000 marks. More than half the total number had capitals of

between 250,000 and 21/2 million marks. One-tenth of the total number had capitals of between 21/2 and 10 million marks, and a little over a hundred companies exceeded this figure. Since then the number of larger companies has considerably increased. Yet of the 5,500 joint-stock companies whose figures we quote the capital (including debentures) still averages 2.05 million marks. The estimated average capital for all existing joint-stock companies is 1.35 million marks.

Business profits.

There have been no new statistics elicited as to the net profits of all existing joint-stock companies, nor as to the dividend paid. In the following table those

companies are included whose shares are or have been quoted on the Berlin Stock-Exchange.

Summary of business proceeds of joint-stock companies registered at the Berlin Stock-Exchange.

			Share capital in	Dividends	paid	-
	Year	Number	million marks	Totals in million marks	Per cent	
	1875	330	3,178.8	135.93	5.31	
	1880	430	3,225-4	146.55	5.20	
	1885	501	2,819-3*)	141.79	6.28	
	1890	605	3,802.0	271.63	8.61	
	1895	680	4,131.0	267.01	8.60	
1	1900	930	6,676.9	539.54	9.41	

From this table some idea of the conditions prevailing may be gained; for not only is the number of companies very large, representing more than two thirds of all German capital actively invested, but the above figures are also proportionately in agreement with the statistics relating to various professions for the year 1895.

D. Stock and other Exchanges.



Number of Exchanges.

During the last century the number and importance of the Exchanges have considerably increased, and they have not only become the means of judging the standard

of credit, of effecting transactions in bonds and securities, but they also guard and regulate most minutely all the above mentioned undertakings as well as their credit value. There are 30 exchanges in Germany to-day, 17 in Prussia, 2 in Bavaria, 4 in Saxony, 1 in Wurtemberg, 1 in Baden, 2 in Alsace-Lorraine (as well as a Wine-Exchange in Colmar) and 1 in each of the three Hanseatic towns.

^{*)} This number is not accurate, as the share-capital of 30 Fire-assurance companies could not be elicited, and is therefore not included.

The only Exchanges whose influence extends beyond their own local or particular sphere, and which effect the money-market in general, are those of Berlin, Hamburg and Frankfort o. (I). The importance of the remainder is either a purely local one or makes itself felt only in particular securities and kinds of goods.

The number of persons attending the Exchanges is shown in the follow-

ing table:

	Berlin	Bremen	Breslau	Dres- den	Frank- fort o. M.	Ham- burg*)	Cologne	Leipsic	Munich	Stutt- gart
1900	2,876 3,025 2,912	1,345	384 308 256	45 44 45	659 580 523		294 — 393	557 519 468	95 85 90	77 74 69

Stocks and Shares. Doth Stock and Produce Exchanges, about one-tenth being exclusively Stock-Exchanges, and the remainder

exclusively Produce Exchanges. The Berlin Stock-Exchange list quotes about 2,150 stocks and shares, principally German and foreign securities and state loans, bonds, railway debentures and securities and bank shares, as well as many industrial shares. The Frankfort Exchange list, which influences the whole of South Germany, quotes about 1,100, and the Hamburg Exchange about 600 stocks and shares.

The following table shows the number of new stocks and shares admitted to German markets:

		1897	1898	1899	1900	1901	1902
			Το	tals in mi	llion mark	KS	
Home Stocks	Total value	3,788	2,093	2,298-1	2,423.4	2,366	2,748
and Shares	Proportion con- verted	_**)	163	126	127	25	645
Foreign Stocks	Total value	890	2,534	1,504.4	448	778	2,632
and Shares	Proportion converted	-**)	782	647	8	12	1,171

Position of the Hamburg and Bremen Exchanges.

The principal position in the produce market is held by the Hamburg Exchange. An enormous international trade takes place there, the most important articles being coffee and sugar, the general goods trade as

well as the settlement of freights and the marine insurances. The Bremen Exchange is chiefly of importance for the tobacco and cotton trades. Leipsic is the centre of the textile industry and at the same time the seat of the German book-selling business, whilst Essen is the market for mining shares, &c.

*) The number for Hamburg amounts to many thousands, but cannot be ascertained exactly, as the Exchange is open to everybody.

**) Only the total value of conversions effected in home and foreign stocks and

shares can be ascertained for 1897, the amount being 1,400 million marks.

German Exchange business for foreigners.

The Exchanges of Germany play an important part in foreign undertakings and arbitrations. These transactions are heavily burdened by legislation and stamp duties, though the latter have been partially remitted.

The total sum for 1893/95 amounted to 111,000 marks, but dropped in 1902/3

to 55,000 marks owing to a falling-off in business.

German Stock-Exchange business

The participation of German capital in foreign stock markets is increasing on the other hand. At the end of 1893, 167 German banks and bankers had securities amounting to 290.3 million marks deposited abroad

for their own account or on behalf of their customers. At the end of 1903 the sum had reached 1,002-4 million marks.

E. Savings-Banks.

See p. 39.

XU. Insurance affairs.

Branches.

Insurance affairs have reached a higher state of development in Germany than in any other country, and have been helped forward both by private initiative

and by the state. They include the most varied spheres of operations in industrial life, and are furthermore growing into one of the weightiest factors of social politics, a factor which aims at improving the social condition of millions of persons. Starting from the oldest branches of marine and fire assurance, expansion has taken place in various other directions,—insurance against damage by hail, storm or water, insurance of goods in transport, of glass and cattle, against sickness and accident, for dowries, military service and risks of war. The complex many-sidedness of modern life and the growing need for security against contingencies of every kind have occasioned the institution of insurance against theft and burglary, against business risks and losses, for the redemption of bonds and against the falling in value of securities, as well as insurance for quarantees, credit and

Insurance by the State.

liabilities and the insurance of bicycles. This protective system was crowned by the mission inaugurated by H. M. Emperor William I. on November 17th 1881, and

continued by H. M. Emperor William II. on February 4th 1890, for a continual social insurance, a system which is gradually and steadily being extended to further classes of the public.

On May 12th, 1901, an Imperial Act dealing with pri-Private Insurance. vate assurance undertakings came into effect, providing for the establishment of an office for inspection of

Its object is to protect and supervise the inprivate insurance concerns. surance business of Germany.

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Insurance of persons.

Life insurance.

In 1901 there were 27 joint-stock companies and 30 mutual insurance companies doing business privately in Germany as life-insurance companies. These

57 companies had issued at the end of 1901 nearly 6 million (5,998,374)

policies in their various branch establishments, amounting to a total assurance of 8.3 milliard marks. The average sum assured per person was about 1.400

marks. In the year 1901 the premiums paid amounted to 358.5 million marks. The development of this branch of insurance business is constantly on the increase.

Sums in million marks.

Year	Number of companies	Amounts assured	Premiums paid	
1880	47	2,281.99	78.04	
1890	56	4,311.51	164-10	
1896	60	6,266-12	260.82	
1897	60	6,731.58	283.76	
1898	59	7,182.43	306-82	
1899	59	7,601-68	323-10	
1900	58	7,999-96	341-17	
1901	57	8,347.64	358-51	

48 of the companies dealing with insurance in case of death issued policies to the number of 1,478,936 and amounting to 6,094·10 million marks. 525,000 of this number were death policies amounting to 2,240 million marks (or 26·6 per cent of the total sum), and the rest were tontine insurance.

33 companies undertook burial insurances or insurances for the working classes in case of death, and at the end of 1901 had issued 3,942,963 policies, amounting in value to 748.3 million marks. The claims paid in 1901 amounted to 94.3 million marks.

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Dowry and military service.

48 companies for dowry insurance issued 321,982 policies for survivorship covering a sum of 598.6 million marks; and 7 companies issued policies against mili-

tary service to the number of 254,493, amounting to 306.7 million marks. The annuities amounted to 46 million marks.

90

Annuity insurances.

In 1901 annuities were issued by thirty-five companies. At the close of the year 53,464 policies were in force, covering 17.09 million marks in running annuities, and

2.17 million marks in deferred annuities. There were, moreover, 1,280 policies covering 1.6 million marks in annuities for sick persons, and 815 policies for

invalidity annuities, amounting to 0.5 million marks. The average amount of each annuity insured was 360 marks.

Besides this, 5 companies had tontines amounting in all to 76.4 million

marks with as many as 76,964 persons insured.

Insurance against accident.

The insurance of human life forms the object of 28 accident assurance companies, which, like most of those already enumerated, do not confine themselves to one

branch of business, but, with a view to the promotion of wider and more secure business operations, have added sundry kindred branches of insurance to their field of activity. Nearly all in addition to accident insurance give some attention to liability and guarantee insurance. In 1901 their receipts in premium and fees amounted to 48.6 million marks, while the sum paid in replacing losses was 15.9 million marks, the total surplus remaining being 6.75 million marks.

96

Property insurance.

While these companies confined themselves chiefly to the insurance of human life, by far the greater number were directing their attention to the insurance of pro-

perty against risks.



Fire insurance.

The foremost position was held by the fire insurance business. Here the State and the Municipalities have taken the lead in establishing insurance offices. At

present 345 public and private insurance offices exist, 29 of which are jointstock companies; the remainder are mutual insurance establishments and are made up of 57 public societies, 242 Prussian fire insurance associations of restricted field, and 17 large private mutual companies.

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Joint-stock companies.

The most important division at the present day is formed by the joint-stock companies, which claim 55 per cent of the total property insured, or 78.7 million marks. The

increase in business during the last 10 years amounted to 26.5 million marks. The receipts in premiums for the year 1901 amounted to 164 million marks, whilst claims paid and cost of collecting amounted to 55.4 million marks. The share-capital employed amounted to 160 million marks, and the reserve funds to 49.3 million marks.

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Societies.

The societies showed in 1900 insurances to the amount of 49.7 milliard marks, consisting of 45.2 milliard marks for the insurance of real estate, and 4.5 milliard

marks for portable property. The receipts (including 66.8 million marks in premiums) amounted to 77.2 million marks, whilst the expenses totalled 74.4 million marks including 2.8 million for fire-extinguishing apparatus*) leaving a surplus of 2.9 million marks.

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Mutual insurance companies.

The 17 mutual fire insurance combines insured property to the value of 11.6 milliard marks in 1901. Their receipts from premiums amounted to 29.5 million marks,

while their expenses in claims and collecting reached 7.5 million marks.

*) The total amount expended in this direction during the last quarter of the past century was 65 million marks.

Summary showing the development of fire insurance offices. (Sums in million marks.)

Year	Societies			Joint-Stock Companies			Mutual assurance Companies		
	Num- ber	Sums insured	Pre- miums paid	Num- ber	Sums insured	Pre- miums paid	Num- ber	Sums insured	Pre- miums paid
1	2	3	4	5	6	7	8	9	10
1890 1895 1899 1900 1901	57 57 57 57 57	35,706·0 41,931·3 47,829·9 49,677·1 ?	47·0 60·0 66·8 64·7 ?	30 29 30 29 29	50,505·7 60,959·5 74,279·7 77,097·3 78,692·0	103·1 123·3 164·3 167·2 164·0	19 19 17 17 17	8,127·2 9,704·9 11,025·0 11,328·3 11,624·9	21·9 25·1 28·3 28·9 29·5

Traffic insurance.

The insurance of goods in transport has assumed almost equal dimensions with that of the fire-insurance business. In 1901 there were 47 large companies

and a considerable number of smaller offices and private firms for the insurance of goods in transport, the majority of which were working on a mutual system. The principal portion of the business, however, fell to the share of the joint-stock companies. These collected premiums to the value of 108.4 million marks, out of which a surplus of 2.4 million marks remained. The sums paid in claims amounted to 44.7 million marks. 40 companies represented a paid-up share-capital of 20.7 million marks, and 76.3 million marks in shareholder's securities. The greater part of the entire business was of course done in marine insurance; the 12 Hamburg companies, for instance, insured property in this branch alone amounting to 5 milliard marks.

Cattle insurance.

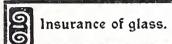
Another important field for the insurance business is found in agricultural crops, cattle and stock. The insurance of live-stock and crops against damage by

hail appeals chiefly to persons engaged in agriculture. It is principally carried on by means of co-operative associations, there being at the present moment more than 6,500 societies for the insurance of live-stock scattered over the Empire. Various German governments are trying to establish agricultural insurance offices, which will be supported by the local societies, and will in turn guarantee them insurance. In Bavaria, for instance, there is the "Bavarian Agricultural Insurance Office," which at the end of the year 1901 included 1,551 societies and a total of 74,030 members. The importance of the private insurance business is also shown by the magnitude of the sums insured in 24 of the largest live-stock insurance companies,—356.7 million marks for the year 1901 premiums being paid to the value of 8.1 million marks, and 5.1 million marks in claims.

910

Insurance against damage by hail.

There are 5 joint-stock companies which undertake insurance against damage by hail. In 1901 these companies insured property to the value of nearly 1 milliard marks (961.4 million); their premiums amounted to 9.1 million marks, and the total of claims paid for damage sustained totalled 5.8 million marks. There are also 12 mutual insurance offices with a general organisation extended over the whole Empire, and 5 other such companies working with either a locally or a materially restricted field of activity. The former insured property to the value of 1,321.1 million marks, the premiums paid amounting to 14.1 million marks, and the total sum paid out in claims for damages reaching 11.2 million marks; the latter insured property to a value of 319.4 million marks, their premiums amounting to 3.8 million marks, and their expenses (including claims paid up and estimate making) to 3.5 million marks.



The insurance of glass is closely connected with the Insurance of glass. insurance against damage by hail. Exact statistics for this branch of insurance cannot be elicited, because

a large number of the fire insurance offices also make a business of insuring glass, and have no separate statement of figures upon this particular matter. The following are the results declared by 9 offices doing business exclusively in class insurance, and by 11 other businesses which publish particulars upon this branch of their business:—the whole 20 companies commanded at the end of 1901 a paid-up capital of 381,000 marks and 395,000 marks reserve funds, 1 million marks in cash and at the bank, and 2.6 million marks in mortgages and landed property. The total amount of premiums paid was 3.6 million marks, the expenses in claims for damages amounted to 3.1 million, leaving a total surplus of 163,000 marks.

The tremendous claims, sometimes coming in bursts, which are made upon the fire, transport, and damage by hail insurance companies make it absolutely necessary

for the larger offices to secure themselves by means of re-insurance. 35 jointstock companies exist (with a capital of over 110 million marks) whose business is partly or entirely devoted to re-insuring or sharing the risk of insurance. Their premiums and fees for 1901 amounted to 214.1 million marks, and their expenses arising from claims paid alone to 90.9 million marks. The total profits figured at 5.2 million marks.

New branches of insurance business.

There are finally a number of other branches of insurance which have only been lately created and are not at present of very great importance though taken up

by the above mentioned companies. Amongst these must be mentioned, for instance, the rapid development of insurance against burglary. In 1901 there were 19 companies undertaking this branch of insurance; their premiums amounted to 2.5 million marks, and they paid out as much as 343,000 marks in claims. 2 companies may also be mentioned which, with a capital of 2 million marks, exclusively undertook insurance against damage occasioned by water mains, whilst the greater part of the above-mentioned companies, particularly the fire insurance companies, undertook this as a subordinate branch of insurance.



Lucrativeness of private insurance undertakings.

The following table of figures*) showing the business results of the above-mentioned joint-stock insurance companies, gives some idea of the lucrativeness of this branch of business:

1. 7	otal Surplus	2. Surplus from Premiums	
Year	Total (million marks)	Percentage of total of premiums	
1890 1895 1900 1901	70·32 81·28 108·42 129·74	12·0 8·7 9·6 11·3	



Foreign companies.

Besides the German companies there are a number of foreign insurance companies doing business in the German Empire. Their admission to the Empire is

dependent upon permission granted by the Imperial Chancellor after they have been reported on by the department for the supervision of insurance business. This permission has up to the present been granted to 22 life, 8 fire, 8 accident and liability insurance and 6 transport insurance companies of considerable size, principally of Austrian, Swiss, English and American nationality.

It must always be kept in mind that all the figures given above only contain the amount of risk-securities insured by German companies, for it is not possible to ascertain exactly what share foreign companies claim, nor to ascertain the amount of assurance business undertaken by German companies abroad.

XVI. Imperial Social Insurance.

See special article.

XVII. Unions and Associations. A. Unions and Leagues.

Side by side with the individualism which permits every person to follow his own bent, there exists in German intellectual and industrial life a strong tendency towards union for the promotion of common ends. This tendency has been active for divers purposes from times immemorial, and to-day there is no branch of social, scientific or intellectual life which has not been affected by its influence.

*) These figures cannot of course include all companies; the number of those omitted is, however, inconsiderable, so that the figures give a fairly correct idea.

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Religious Societies.

The first group under this heading is formed principally or exclusively by societies of a religious or scientific nature, and other societies serving for the further-

ance of knowledge. In addition to the state synodic establishments it comprises, the great voluntary religious associations of the Protestant Union, the Gustav-Adolf Society, the Evangelical League, the German Catholic Diet, the Bonifatius Society, the Society for mission-work at home and abroad, the various religious orders and all the numerous associations of different religious Societies, both local and corporate, for the direct or indirect promotion of religious objects.

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Societies for the furtherance of Art and Science.

Art and scientific research are encouraged by the State academies and assisted by Commissions and Institutes at home and abroad as well as by such private Societies as the Diet of German Jurists, the Law Society,

various scientific societies of medical men, naturalists, geographers, historians, philologists, engineers, political economists and social economists. All such societies, whether belonging to localities, to separate states or to the nation at large, are constantly employed in the endeavour to lay before the public the results of their labours and the present state of their knowledge, either by means of the Press or by holding Congresses, thus enabling the necessary grouping and classification of individual effort and efficiency to be effected.

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Patriotic-political Leagues. A second group is formed by the Societies of a patriotic or political character, having the interests of both the State and the Community in view. On the one

hand there are political party organisations with their central control and the elaboration of the party machine down to the district leagues; on the other hand there are leagues for safeguarding the interest of the father-land and the promotion of national aims.

In this latter class the "warrior societies" (Kriegervereine) and leagues are most prominent. The majority of them belong to the "Kyffhäuser" League which was founded some years ago. Societies with patriotic and political aims are represented by the German Colonial Society, the Pan-German League, the "Ostmarkenverein" and various other societies for preserving German nationality and customs, such as the Society for the preservation of the German language, the Schools' Union and the Navy League.

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Social Clubs and Societies.

Patriotism and politics are fostered by many other societies as well, societies whose first aim is of a recreative character. These often assume the shape of

assemblages of individual classes. In every place, large or small, countless social unions forming centres of recreation and amusement for the various ranks of society are to be found. Some of these are founded for special purposes by certain classes, being sometimes associated with old traditions; such are the social unions of shopkeepers and sea-faring men, the manifold associations of artists and students and the shooting guilds, and sometimes with more modern aims of life in view such as gymnastics and singing, societies, sport, cycling and card-playing clubs, &c.

The gymnastic, shooting and singing societies did much at one time to pave the way to the foundation of the Empire, and carried out on a small scale what the national societies were striving to do throughout the whole country.

Lodges; Charity.

Then again various fraternities and lodges have likewise duties to perform, both of social and public utility. Many of these societies have been founded for charitable and

philanthropic purposes, sometimes for the speedy relief of temporary necessity by the organising of charitable festivals and bazaars, at other times working both preventively and directly by the establishments of permanent institutions, such as numerous associations for the care of the sick, hospital unions, the Order of St. John, the Red Cross Society and the Women of the Fatherland Aid society, &c.

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Social Care.

A great social duty incumbent upon many of these associations is to supplement the task of making provision for toilers and workers who are in distress.

In addition to crèches, kindergartens, and holiday institutions, peoples' kitchens, coffee palaces, public baths, convalescent homes, homes for consumptives of the working classes, and homes for the aged,—these and similar societies have organised employment agencies as well as working mens' colonies, and created residential and other dwellings.

Religious and social considerations have co-operated in bringing about a reform in the public and private mode of relief of the needy, and have paved the way for their classification and grouping into organised associations and unions. These have found their intellectual center in the German Union for the relief of the poor and for general charitable purposes, and also in the so-called Elberfeld system which has rendered possible the necessary co-operation between the centers and individual workers.

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Women's Societies.

Since the so-called woman's question has arisen, various associations have been called into being to represent the social interests of women and to protect and

minister to the world of women-workers, and these have been formed into various Leagues. Among the most important may be mentioned the League of German Women's Associations, embracing 159 societies, and the League of Societies for Women's Progress.



Representation of the interests of various trades and professions.

The associations representing the interests of trades and professions have adopted new and specially organised methods in accordance with the demands of modern industrial and business life. Here too, we find countless associations and organisations called

into existence not only by the State but also to a large extent by private initiative. The further development of these reveals a certain tendency towards a future comprehensive concentration and grouping together. This tendency is entirely at variance with the opinions which prevail at the beginning of the 19th century as to the complete and inevitable resolution of society into units, for at the commencement of the 20th century numerous features for its re-concentration into groups are to be found.

We must first consider the representation of professions as regulated by the state. Germany has at the present time 158 Chambers of Commerce and Trade, and 10 Chambers of Agriculture around which the People's Industrial Council (at present inactive), the German Agricultural Council, and the Colleges of Land Economics are grouped. The interests of traffic are represented by the Home-Railways' Council. Other offices have called in the assistance of expert advisers, such as the Colonial Council, the Board of Emigration, the Stock Exchange Committee, the Social Economic Committee, the Workmens' Statistical Board, &c. The learned professions are regulated by councils of doctors and lawyers.

Besides these there are various independent associations to protect the interests of agriculture, manufactures, trade and commerce,—such as the Farmers' League, the German Commercial Diet, the Central Association of German Manufactures, the Industrial League, the Society for guarding the common economic interests of Rhineland and Westphalia, the Society for commercial Treaties, the Central Society for preparing and examining commercial Treaties, the Society for the maintenance of the Gold-standard. &c. Then there are other Unions to represent the interests of special classes and callings,—the Union of German Smelters, the large Societies of Architects and Engineers, the Unions in the medical profession, the German Fishery Union, the Inland Shipping Union, the German Lawyers' Diet, &c., and Associations which have been established locally throughout the land for all the more important occupations and branches of industry. Their endeavour has been to increase the general knowledge of the community and to spread knowledge among their members on subjects within their province by the carrying out of practical experiments, the publication of literature and periodicals dealing with special branches, &c. This has also been done by the Unions for improving and furthering certain branches of knowledge, such as the Society for improving the breeding of Cattle, Horses and Dogs, the Union of Gardeners and Fruit-growers, &c.

Officials too have formed themselves into Associations for the representation of certain interests. Amongst others the German Officers' Union may be mentioned and the 174 various officials' unions which are leagued together, with a total membership of 128,000, into the German Officials' Societies League. There further exist Unions for Post-Office officials, for railway servants and others. Although all these associations serve the more general objects of their particular profession or calling, there are a number of others whose first aim is to represent their pecuniary interests.

Expert Unions.

Certain industrial branches show a strong inclination to combined representation; for instance, in the mining and smelting industries there are 9 associations representing

more than 400 mines; in the iron trade there are 4 such associations with over 2,000 members and works; in the remaining industries there are upwards of 30 larger and smaller unions, principally representing mechanical engineering, shipbuilding, the chemical, textile, leather, paper, brewing, destilling, milling and tobacco trades and industries. The Exchange Association

of German Booksellers with its many thousand members is not limited to Germany, whereas the Central Union of German itinerant Booksellers is exclusively Imperial. The small shopkeepers have combined together into 110 associations with nearly 7,000 members, the hotel and inn-keepers into a league of 200 associations with 17,000 members, the majority of these large Associations being built up by local organisation.



Association in the liberal and learned professions.

Kindred leagues especially representing the industrial side of professional interests also exist in many of the liberal and learned professions, as for example the various German authors' societies, associations

of journalists, musical societies, the German Stage Union, the Stage Association, the Artists' League, various arts and crafts societies, societies with funds for the relief of teachers, and societies for female teachers. These societies look after and assure the private circumstances of members of their profession who are unable to work, and also provide for their widows and children. They not only watch over the interests of the various callings, but aim also at rendering material support.



Employers'
"Cartels" and
Leagues.

A number of the associations which serve the interests of the professions have also made it part of their object to represent their members in the position of employers; at the same time there exist also a number

of special employers' organisations for effecting the same purpose. all come the employers' leagues proper, cartels, syndicates, &c. (see p. 29) the object of which is to look after and generally regulate the conditions of supply and demand within their branch, then come the so-called Unions of Employers of Labour [Arbeitgeberverbände]. The particular purpose of these latter associations is to counterbalance the working men's associations and their endeavours as well as to oppose any efforts on the part of the associated working men to secure an alteration in the existing conditions of work or wages when it does not appear justifiable to the employers. At the head of these stands the German Central League, and next to it the Hamburg League for the Employers of Labour embracing a number of large associations from among the most varied branches of industry, and extending to a number of neighbouring places. The next in importance is the Berlin League of Employers of Labour, &c. In addition to these general leagues there are others for special branches of industry, sometimes of a local character and sometimes extending over large districts of the country. There are 3 for smelting and mining concerns, 11 for the metal industry, 4 for the brewing industry, 4 for. the textile industry, 9 local and 1 central for the building trade, 2 in the hat trade, 1 in the manufacture of wall-paper, besides 3 leagues of masters of handicraft in the wood-work industry.



Workmen's associations.

There are four principal groups of workmen's associations—industrial unions, trades-unions, Christian working men's societies and miners' corporations. In

1902 the first group included 60 central leagues with about 733,000 members,

nearly half as many again as in 1897. There were also 11,000 local organisations. The budget of this immense League amounted to 21 million marks with a fixed capital of about 101/4 million marks. The expenditure amounted to 10 million marks and was made up of 31/2 million marks for the relief of the needy, and 2 million marks for supporting strikes. Up to the present time the part taken by female workers in the industrial union movement has been inconsiderable, although it has much increased of late. In 1902 it included 28,200 females, and has more than doubled since 1898. This number is, nevertheless, only about 3 per cent of the female workers who might enrol themselves in such an organisation (901,000 in all). The largest number of members of the organisation come from among the metalworkers (128,000), masons (82,000), wood-workers (70,000), miners (42,000), and hands employed in the textile industry (38,000). The most perfectly organised of these Unions is the Book Printers' League, consisting of 33,000 members. Among the others, that of the factory hands consists of 33,600 members, those of the carpenters, shoemakers, carriers, tailors, persons employed in the tobacco trade, the building trade, and harbour hands comprising between 14.000 and 24.000 members each.

Crades-Unions.

The second group, the so-called "Hirsch-Dunker" Trades-Unions, comprised 103,000 members in 1902, the majority of them belonging to unions of machine

engineers and metal workers. The entire property of the trades-unions, including the invalid and burial funds, amounted to 31/4 million marks at the end of 1902. The sums expended in 1902 for the support of members who were out of work amounted to about 250,000 marks, the sums distributed for support during sickness to 62,000 marks. The total outlay in 1902 for sickness and burials, support of the disabled and needy, for providing legal protection and for educational purposes, amounted to 775,000 marks.

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Workmen's Christian societies.

In the third group we find industrial and religious forces working together. The Evangelical Societies numbered about 120,000 members in 1902, between 80,000 and

90,000 of whom were leagued together into a Central League. There are 800 Catholic workmen's societies with about 180,000 ordinary members.

The total number of German workmen organised in this manner amounts to about 11/4 millions.

Besides these three free groups of organisations there are the Unions of Miners, which are subject to state control.



Journeymen's societies.

In the middle of the nineties there were 140 journeymen's societies in existence, with a membership of half a million. They distributed 32 million marks in aid

and support, and their funds amounted to 77 million marks.

Business and Commercial Societies.

Some of the private official and commercial societies combine recreative and educational objects with industrial aims. The most important of the commercial

leagues is the German League of Commercial Societies, comprising 86,000 mem-

bers, 25 per cent of whom are principals and 75 per cent employees. The principal aim of this and 3 other great leagues, besides the object of providing recreation, is a practical economic one, its chief object being to provide information as to situations vacant, the assistance of those out of employment. and technical education in their particular branch. In addition there are four large associations of shopkeepers' assistants, where the tendency is almost exclusively industrial.



Private officials societies.

The associations of private officials, with about 15,000 members, are of a similar character to the mercantile or commercial societies. The funds at their disposal

for giving assistance in cases of sickness or disablement amounted to 3 million marks. The German Foremens' Association, with a membership of 35,000, is made up of private and state officials.



In one branch of trade, at least, the employers and em-Tariff associations. ployed are associated to-day in a common organisation, as they used to be in times gone by, for a mutual

regulation of the conditions of work. In the German book-printing trade we find an association of principals and apprentices formed for the promotion of mutual agreements as to tariff. Similar associations are gradually making more and more headway in other callings, such as the building, tailoring and upholstering trades.

Guilds.

Attempts have, however, been made to keep up at the same time the old forms of industrial organisation by giving new life to the system of guilds. Amongst the

handicrafts there are almost 8,000 quilds including about 1/4 million workmen sa further 50,000 or so artisans are incorporated in the trades-unions).



Organisation according to social legislation.

For information about the organisation of workmen and employers into trade and sick-Funds associations, and councils of advice of various sorts, as connected with social legislation, see special article.

B. Associations.



Associations.

The associations constitute a group of societies of considerable importance. They form to a certain extent an opposition to the unions of manufacturers, being in-

corporated combinations of consumers. They also serve to unite manufacturers for the purpose of obtaining the necessary means, principally credit, to manufacture. And, finally, this form of organisation embraces certain undertakings, which, in the form of co-operative societies, represent a distinct form of enterprise.

German co-operative societies and associations can look back upon half a century of successful activity. In 1849 Schultze founded in Delitzsch the first co-operative society for buying and selling carpenters' raw material, and in 1850 the co-operative society for advancing loans. About the same time Raiffeisen founded the Hammersfeld Association for the relief of impecunious agriculturists, and sowed the first seeds of that magnificient institution the Agricultural Savings and Credit Bank Association.

The movement has made great strides, particularly during the last ten years of the past century. In 1890 the number of trade and industrial co-operative societies was 7,608; in 1895, 13,005; in 1900, 19,557. The total number of local associations amounted in 1902 to more than 22,500, which means an increase of about 200 per cent during 12 years. (Dore than 6,000 of these were agricultural associations with a long way over a million peasants as members. By far the larger number of associations in 1902 were combined into 35 Leagues. The most prominent among these are the following:

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The three chief Unions.

The General Union of the self-aided Trades and Industrial Associations, which has its head-quarters at Charlottenburg and comprises 29 sub-unions and

1,651 associations; the General Union of Agricultural Associations, at Darmstadt comprising (July 1st, 1902) 25 affiliated unions and 8,363 associations; and the General Agency Union, at Neuwied, embracing 3,982 associations.

In 1902 the associations belonging to the Charlottenburg Union numbered about a million members, their business credit amounted to 179½ million marks and their reserve to 62.9 million. The associations lent their members about 3 milliard marks in credit, raw material, dwellings, the necessaries of life, &c.

The Darmstadt (formerly Offenbach) General Union comprised 7,787 associations in 1902, with a business credit of its associates amounting to 18.4 million marks and a reserve fund amounting to 20 million marks. The Neuwied General Union reported on January 1st 1902 that there were 3,190 associations with a membership of 288,000 belonging to the Union. The assets of the Union amounted to 241.1 million and its liabilities to 240 million marks, so that a clear profit remained of 1.1 million marks. It lent its members 147 million marks in loans and purchase-money. The Central Credit Bank belonging to the Union showed assets amounting to 53.6 million and liabilities amounting to 53.3 million marks. The clear profit of 0.3 million marks was divided in dividends at the rate of 31/2 per cent.

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Statistics of Associations. Co-operative and Building Societies.

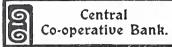
Besides these three gigantic unions, there are smaller ones of some importance, as shown by a review of the collective activity of 22,500 German associations which were classified on March 31st, 1903; 13,481 credit co-operative societies, people's and industrial

banks, societies for advancing loans, savings and credit bank associations were carrying on business and advancing personal credit through the agency of a number of central banks. Most of the remainder were chiefly employed in buying and selling, some also in producing goods. The whole were divided into two groups, of 723 industrial and 5,500 agricultural associations.

Amongst the former, 323 were producers, and amongst the latter the

Amongst the former, 323 were producers, and amongst the latter the majority were occupied in production on their own account, such as dairy produce, wine and fruit growing, &c.

About 1,600 were engaged in the purchase of raw materials, about 250 in the sale of goods, and over 600 were workmen's associations (Werkgenossenschaften). Among the other associations, the most important were the 1,847 co-operative supply associations.*) The constantly increasing importance, however, of the building and dwelling associations (about 500 in number) must not be underrated. Only 625 of all these associations are not subject to the Associations Act. (Dore than two-thirds of those registered have unlimited, and 6,400 limited liability.



The Central Prussian Co-operative Bank was founded to serve as a centre of credit for the various Prussian associations, its original capital being 20 million marks,

which has since been increased to 50 million. The total turnover in 1902/03 amounted to over 8,200 million marks, and in the middle of 1902 more than 9,000 associations, mostly agricultural, with nearly 1.3 million members were registered on its books.

XVIII. Schools and Education.

See special treatise.

XIX. Art, Industrial Art and Architecture.

See special treatise.

XX. Theatres and Concerts.

As in the case of many of the subjects discussed above, the development of the German theatre shows characteristic features perfectly at variance with those of other countries.



Permanent companies and theatres.

The most important factor is formed by the large permanent theatres, which are sometimes court theatres, and sometimes municipal theatres which receive considerable subsidies from the purses of German Princes

or from the municipal revenue. Sometimes, too, they are undertakings of a purely private nature.

The German Stage Almanac mentions about 700 German theatres, 550 of which are situated in the German Empire. Of this number 100 are municipal theatres and 40 court theatres.

*) These are divided according to the nature of their liability into 220 associations with unlimited liability and 1,527 with limited liability, 5 with unlimited instalment liability, and 95 non-registered associations. Their numbers show a rapid increase. Whilst in 1890 only 984 co-operative supply associations existed, there were 1,400 in 1895 and 1,528 in 1900. The growth during the last 2 years (1901, 1902) has therefore been an unusually large one.

In the majority of these theatres performances are given uninterruptedly during the greater part of the year from Autumn to Spring. The actors have fixed engagements, and performances are given on all, or nearly all the days of the week. Occasionally one company will play consecutively at a number of theatres in the same neighbourhood. Other theatres, again, have touring companies, one for drama and one for opera. About 80 theatres in the German Empire only give performances during the summer or when the bathing resorts are in full swing.

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Travelling Companies.

In addition to the permanent companies of the abovementioned theatres, there exist also about two dozen travelling dramatic companies which tour throughout the

Empire and are always well received, particularly in places which have no proper theatre. The number of these touring companies is certainly on the decline in Germany, for there, as opposed to other countries, nearly every place endeavours to support a permanent theatre of its own.

Those dramatic companies, however, which exist for the purpose of reproducing plays in the various dialects—such as Low-German, Bavarian, Viennese, Swabian, Alemanic, &c.—are still of as much importance as ever.

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Staff.

In the season 1902/03 the lists of the Union of members of the German stage comprised about 20,000 actors and actresses, vocalists, and chorus singers en-

gaged in German theatres throughout the world. About 15,000 from among this number were actively engaged.

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Repertoirs.

Authors.

During the year 1902/03 between 650 and 700 novelties were put upon "the boards that typify the world." One-sixth of this number were operas, operettas and

other musical pieces. During the same year about 900 German authors, translators, poets, and ballet composers, and 250 musical composers and colaborators had their works performed, or had them accepted for performance. The dramatic authors who have had their works staged during the last few years number 1500–1600, and the number of composers is about 400.

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The Art aming the people.

These statements do not however by any means exhaust all that can be said as to the development of the art. Besides the performances given by amateur

societies in most towns and villages, evidence is often found of an endeavour to draw wide circles into co-operating in serious dramatic efforts. To this class of society belong first and foremost the student clubs for the resuscitation of classic art, and next in importance come the historical, patriotic and religious plays which are performed in so many places. The most important of this latter are, for instance, the Passion Play at Oberammergau and the festival performances at Rothenburg and other places. The festival play house at Bayreuth holds quite a unique position.



Free stages and popular art.

The serious side of the Art also is marked by the efforts which are being made by numerous societies to bring before the public by means of free stages and

aspiring talent plays which are unsuitable for ordinary theatrical reproduction. Efforts are also being made to familiarise the broad masses of workmen and artisans, and also school children, with literary masterpieces, and thus popularise the art among the people.

Musical life.

There is at present no trustworthy information concerning the richly developed musical life of Germany; a country where music is studied and enjoyed more

than anywhere else by means of Royal, municipal, military and private orchestras as well as by the above-mentioned societies. Here also, as in all matters connected with the artistic and intellectual activity of the country, figures and statistics can assist but little in giving that appreciation which can only be obtained by personal acquaintance and intimacy with the inner life of the nation.

XXI. Army and Navy.

The standing army.

According to the Act dated March 25th, 1899, Bavaria has to maintain 3 army corps, Saxony 2 and Wurtemberg 1, while Prussia and the remaining Federal States

have to maintain 17, making thus a total of 23 army corps altogether. Each army corps is divided into two or three divisions, each of which is, as a rule, again split up into two infantry, one cavalry, and one field-artillery brigade; these latter are composed of 2 regiments, or, in single instances, of three. The remaining arms, as well as the communication troops, are placed immediately under the direction of the corps commanders. The Guards army corps is distinguished from the rest by the important difference that its cavalry is collected into a special Guards cavalry division. The total number of divisions is 49.

The peace footing of the German army for 1903 was as follows:

	Officers	Non commis- sioned officers	Men	Further personnel	Service Horses
Total Infantry Comprising: a) Infantry—216 regiments and	13,384	48,859	337,067	2,570	810
607 battalions	12,073	44,070	323,569	2,475	_
b) Rifles—18 battalions	388	1,434	9,781	72	
c) Machine-guns,—15 divisions.	60	203	952	1	810
d) Militia—295 districts Cavalry—93 regiments, making .	863	3,152	2,765	22	_
482 squadrons*)	2,436	9,670	57,255	816	65,921

^{*)} Comprising 10 regiments of Cuirassiers, 28 of Dragoons, 20 of Hussars, 25 of Lancers, 4 of Heavy Cavalry, 6 Light Horse and 17 squadrons of mounted rifles.

·	Officers	Non commis- sioned officers	Wen	Further personnel	Service Horses
Field-artillery—94 regiments and 583 batteries	3,062	11,909	53,301	996	33,624
Foot-artillery—18 regiments and 163 companies Engineers—26 battalions, 102 com-	946	3,893	20,403	140	556
panies	598	2,404	13,033	104	_
Communication troops	584	2,764	11,965	125	4,715
comprising:					
a) Railway troops	185	723	3,778		l – .
b) Telegraph troops	50	173	1,353		- 1
c) Balloon troops	17	54	343	5	58
d) Commissariat, 23 battalions.	332	1,814	6,491		4,657
Special formations	572	1,393	2,474	68	- 4
Non-specified military	2,764*)	187	2	223	-
Total peace footing of	24,346*)	81,079	495,500	5,042 **)	105,626
Number belonging to				-	
Prussia	18,939	62,753	384,729	3,891	82,548
Saxony	1,738	5,997	35,899		7,751
Wurtemberg	935	3,260	19,725	201	4,250
Bavaria	2,734	9,069	55,147	582	11,077

The total strength of the German standing army amounts accordingly to 605,967 men. The war footing numbers 2,549,918 men exclusive of the Landsturm (last reserve) and supplementary reserves (about 3 million men). The strength of the German field army is placed at 1,335,000 men, 425,000 horses, and 4,200 guns.

The following table shows the position of the German navy in completed modern vessels.

Number and type of ships	Displacement in tons	Indicated h.p.
14 Battle ships (over 10,000 tons, launched 1891 and later)8 Coast iron-clads (over 4,000 tons, launched	153,568	171,000
1889 and later)	32,912	42,000
1899 and later)	28,669	46,200
Latus	215,149	259,200

^{*)} In addition to 8 officers at the Imperial military court.

^{**)} Including 2,203 army doctors, 1,056 paymasters, 679 veterinary surgeons, 1,011 gunsmiths, and 93 saddlers.

Number and type of ships	Displacement in tons	Indicated h.p.
Transport	215,149	259,200
6 Large protected cruisers (over 5,000 tons, launched 1892 and later)	34,806	62,000
launched 1887 and later 10 since 1898) 7 Small unprotected cruisers (over 1,500 tons,	39,084	103,000
launched in 1890 and after) 6 Gun-boats (over 800 tons, launched 1898 and	11,684	22,800
later)	5,550	7,800
	306,273	454,800

Ships in course of construction:*)

Number and type of ships	Tonnage	h.p.	Total			
ramoet and type of bulps	or surps Connage 1		tons	h.p.		
6 Battle ships each 3 Armoured cruisers **) ,, 5 small protected cruisers . ,,	9,500	9,500 19	16,000 19,000 10,000	79,200 28,000 16,250	96,000 55,000 50,000	
			123,450	201,000		

The remaining vessels comprise 5 obsolete battle-ships, 12 obsolete armoured gun-boats, 3 obsolete armoured cruisers, 9 small cruisers, 1 obsolete gun-boat, 15 training ships, 8 special service ships (amongst them 2 yachts, "Hohenzollern" and "Kaiseradler"), 3 harbour boats, 41 large torpedo-boats (over 230 tons) and 79 smaller torpedo-boats (up to 155 tons). Amongst the larger torpedo-boats are 30 homogeneous ones of modern construction (launched since 1899) each of 350 tons displacement, 6,000 h.p. with a speed of 26.5–30 nautical miles an hour. 12 additional boats of this type are in course of construction.

The following ships are destined to serve as auxiliary cruisers in time of war: 9 high speed steam-ships with a speed of 18–23.5 nautical miles and a total registered tonnage of 103,070 tons, and 20 mail steamers with a speed of 15–17 nautical miles and a total tonnage of 185,400 register tons.

The naval forces (according to the Budget of 1903) are made up of 1,169 naval officers, 207 engineers, 186 medical officers, 149 paymasters,

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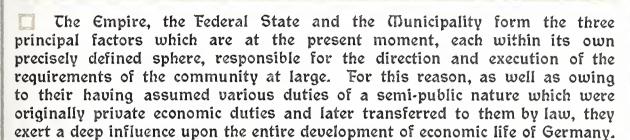
^{*)} Without including those in the Estimates for the present Budget.
**) Including an armoured cruiser of 9,000 tons and 17,000 h.p.

20 chaplains, 583 naval cadets, 114 special service officers (rockets, torpedos, &c.) and 29,764 warrant officers, petty officers and men, in all 32,192 persons. In addition to these must be mentioned the marines and artillery. 1,275 and 2,387 strong respectively, which are attached to the navy, so that the standing strength of the naval forces amounts to 35,854 men.

The supplementary forces on leave and in reserve number about 630

officers, 53 engineers, 373 medical officers, and 78,000 men.

XXII. Administration of Revenues in the Empire, the State and the Municipality.



Principles of the Imperial Budget.

Among the duties which fall to the share of the Empire in accordance with the Constitution and the provisions of Imperial legislation, those to be considered with regard

to the administration of the revenues of the Empire are the maintenance of relations with foreign countries, the administration of the colonies, the Army and Navv. the maintenance of the Supreme Court, "Sozial-Politik" (Social Economics), the administration of the Post, Telegraphs, Telephones*) and the Imperial Railways. The Empire covers the costs connected with these duties in three ways: 1. Indirectly by raising duties and taxes on the sale and consumption of certain commodities **); 2. directly by raising duties and fees, and from the proceeds of its various fiscal enterprises; 3. by making the various Federal States responsible for any deficits arising—unless caused by loans—whilst these States divide among themselves any surplus remaining from certain sources of revenue.

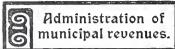
All such matters of internal administration, the ad-Administration of ministration and execution of Justice, the Police, Church revenue in the States themselves. and Educational matters, the advancement of science and art and general economic duties connected with

agriculture, trade and commerce, including the improvement of the land.

^{*)} Bavaria and Wurtemberg have their own Post and Telegraphs Admini-

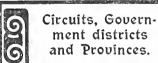
^{**)} Taxation of beer and brandy in Bavaria and Wurtemberg is carried out by these states on their own account, whilst salt, tobacco and sugar are to-day taxed uniformly throughout the Empire.

construction and maintenance of inland navigation canals and harbour quays,—these are all attended to by the states themselves. In addition to these the administration of extensive state works and concerns, such as railways, state canals, mines, forests, estates horse-breeding establishments, &c., must be mentioned in connection with the larger Federal States. The chief sources of revenue of the Federal States are direct state taxes, fees and duties, lottery proceeds and the profits from the various state undertakings.



Finally, the duties of the municipal bodies—which can be subdivided into various classes, and are accordingly governed and limited by the state with regard to their

financial arrangements—are in many respects similar to and closely connected with the duties of the Federal State. They consist in taking care of local interests, attention to public health, care of the poor, schools, making and repairing roads, &c. Waterworks, slaughter-houses, tramways and gas and electric supply works are becoming on an ever increasing scale the property of the municipality, as well as public baths, breweries and brickfields, theaters and concert establishments. They further contribute towards covering the expenses of certain works undertaken by the state, which are directly connected with their locality, and in return receive assistance from the state in executing various tasks. The revenues of the municipalities, apart from the profits of municipal works, consist principally of direct taxes which are raised as a rule in the form of additions to the direct state taxes. In spite of this, however, the sums paid for the use of some of the municipality's property still plays a very important part in certain places. To this must be added the considerable sums often paid for the use of open spaces by such undertakings as transport concerns, electricity, gas and water works which do not belong to the municipality.



Supplementary intermediate positions between municipality and state are held by the local districts, government districts and provinces. They generally have precedence of the municipalities, and have to carry out

the public economic and educational problems. Their requirements for this purpose are met by the state and the municipality, but they also raise direct taxes and dues.

There are no comprehensive figures for this last group, nor for the revenues of the municipalities. It is however easy to see how public duties, affect the Budget throughout the Empire and the Federal States.

Budget of the Empire and Federal States.

The following summary embraces separate figures (in million marks) for the Imperial Budget, the Total Budget of the Federal States and the Prussian Budget, the latter being the largest of the Federal States. The

figures are taken from the estimates for the financial year of 1902, and are expressed in million marks:

	German Empire	Federal States	Separate figures for Prussia
Gross Expenditure			
Total	2,441	4,375	2,622
Ordinary	2,290	4,209	2,622
Regular	2,109	4,042	2,476
Occasional	181	167	147
Extraordinary*)	151	165	_
Gross Receipts			
Total	2,441	4,356	2,622
Ordinary	2,290	4,210	2,622
Extraordinary*)	151	146	_

According to the estimates, therefore, the expenditure and receipts of the Empire balance each other, whereas the Federal States show a deficit of 19 million marks in their revenue.

The total sum required by the State is divided according to the purposes for which it is employed as follows:

	Purposes for which required	German Empire	Federal States	Separate figures for Prussia
l.	Expenditure upon objects of revenue made up of:	511	1,959	1,273
	State Railways	83	1,283	975
	Post and Telegraphs	471	53	
	Mines	_	214	161
	Forests		89	43
	Estates		24	8
	Miscellaneous undertakings	6	166	85
11.	Other demands upon the Government made up of:	1,833	1,355	723
	External **)	57	56	27
	Internal***)	72	400	167
	Education and public worship +)	2	303	165
	Justice	3	199	121
	Finance Board	693	359	243

^{*)} Only such occasional outlays are reckonned under extraordinary expenditure, which are met and covered by extraordinary sources of revenue, such as receipts from the reserve funds or loans.

** Inclusive of the Head of the State, Court and Government.

4) Science, Education, Art, and Ecclesiastical matters.

^{***)} Inclusive of Police, Industry, Commerce, Traffic, Agriculture and Public Buildings.

Purposes for which required	German Empire	Federal States	Separate figures for Prussia
Proportion laid upon the Federal States*) Pensions Miscellaneous Army Navy	565 122 0-4 678 205	 34 4 	
Ill. National Debt (administration, interest and amortization)	94	466 587	278 348

The gross receipts are divided as follows:

	German Empire	Federal States	Separate figures for Prussia
A. Ordinary Revenues	2,290	4,209	2,622
l. Revenues from State Concerns, gross	564	2,621	1,810
" " " " " (net	53	662	537)
State Railways	90	1,898	1,416
Post and Telegraphs	448	59	
Mines		243	190
Forests		177	81
Estates		52	24
Other concerns	26	192	98
ll. Taxes	1,054	599	255
Direct taxes **)		435	211
Sumptuary taxes***)	995	83	0.03
Traffic duties+)	95	56	33
Legacy duties and duties on do-			4.0
nations		26	10

^{*)} See p. 97. The payments are first of all actually made on both sides and appear twice over in the budgets, those amounts figuring as expenditure in the balance sheets of the Federal States, appearing in the receipts of the Empire, and vice versa. Only the difference in amount, however, need be taken into consideration in estimating the respective financial positions.

**) General income tax, property tax, private income tax (Landed property, house property, house rent, industries, capital, and special taxes), licences taken out by itinerant vendors, railway and mining royalties, and other personal taxes (poll taxes).

1) Duties on transferance of land property, stamp fees.

^{***)} Taxes on beer, meat, and other articles in use, dog licences and duties on luxuries.

	German Empire	Federal States	Separate figures for Prussia
III. Taxes	11	181	92
Traffic fees	2	28	8
Fines	8	24	8
Legal fees, Fines	1	129	76
IV. Re-inbursement from Imperial Trea- sury for administration of customs			
and Imperial taxes		65	42
U. Other sources of revenue*) Ul. Surpluses and balances from pre-	661**)	152	86
vious years		37	
Ull. Remittances from Imperial Treasury	—	554***)	337
B. Extraordinary Revenues	151	146	_ 1
l. Receipts from reserve fund	-	8	
II. Loans and balances of Loans in pre-	4 7. 0		
vious years	146	98	_
State	5	40	

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Total gross Budget of the Empire and Federal States.

In order to ascertain the total Budget of the Empire and Federal States, it is necessary to subtract a number of mutual payments both between the several states and between the latter and the Empire. The

payments made between the Federal States amount both in revenue and expenditure to 39 million marks, which comparatively small sum is not subtracted in the foregoing summary. The payments made by the Empire to the Federal States, however, amount to 692 million marks in all; against this must be put payments 596 million marks, made by the Federal States to the Empire. If all the amounts which counterbalance one another in the entire Budget for Empire and Federal States are omitted, the following result is obtained:—total expenditure 5,547 million marks; total revenue 5,536 million marks.

^{*)} The receipts under this heading consist mostly of revenues from state capital (interests, &c.), private and official contributions to state expenditure, rents, proceeds from the sale of landed and portable state property, and occasional, miscellaneous revenues.

^{**)} This includes 581 million marks in proportionate payments (see note * p. 100), 48 million marks from the Imperial old age pensions funds, and 11 million marks from the Chinese indemnity.

^{= ***} See note * p. 100.

Imperial and State Debts. The indebtedness of the various States is of great importance in judging the position of the state finances. In 1902 the consolidated debts of the Empire and the

Federal States reached a total of 13,980 million marks, or 248 marks per head of the population of the Empire. Almost one-half of the total amount (6.72 milliard marks) fell to the share of Prussia, more than a fifth (2.73 milliard marks) to that of the Empire, and more than a tenth (1.46 milliard marks) to Bavaria. The administration and payment of interest on these debts claimed 3 million and 476 million marks respectively, making in all 8.51 marks per head of population. In addition 72 million marks (or 1.27 marks per head of population) were employed for amortization.

6 Employment and security of debts.

These debts are, however, principally incurred for direct profit-bringing purposes. Out of the 11,246 million marks debts of the separate states, no less than

7,404 million marks were expended in acquiring railways for the State, or in the construction of new lines. Further, out of the 2,734 million marks Imperial Debt, incurred for the most part for the defence of the country, as much as 146 million marks was for loans for railways. The total invested capital of the 48,344 kms of German State Railways amounted at the beginning of 1902 to 12,330 million marks; 7.81 milliard marks fell to the share of Prussia, 1.39 milliard to Bavaria, 0.87 milliard to the Kingdom of Saxony, 0.62 milliard to the Empire, 0.60 milliard to Wurtemberg and 0.56 milliard to Baden. The remaining 0.48 milliard marks were divided among the other Federal States.

Among the remaining items which constitute the property of the state the extensive possessions of forests and estates must be mentioned; they include 5.54 million hectares or fully a tenth part of the territory of the German Empire. The revenue derived from this source in 1902 amounted to 116 million marks, which, at a rate of 31/2 per cent (corresponding to the present value of Consols), equals a capital of about 31/3 milliard marks. Since there is still other revenue producing state property of value, it can will be said that there are almost no State Debts which are not covered.

Budget of Berlin.

Although the city of Berlin, in consequence of its size and position as capital of the Empire, is not by any means a typical example, we may complete our sum-

mary by giving the principal items in the budget of this city. According to the estimates for 1903, the 104 million marks ordinary and 13.5 million marks extraordinary expenditure brought the total requirements of the city (inclusive of 72.5 million marks for the cost of working municipal concerns) up to 190 million marks. The general administration claimed 14.3 million marks; the local contribution to the state police-administration 5.2 million marks; public health 16.9 million marks (12 million for regular and about 5 million marks for occasional expenses); education and furtherance of arts 25.2 million marks (21.9 million for regular and 3.3 million marks for occasional expenses); the furtherance of economic interests 21.5 million marks (18 million for occa-

sional and 3.5 million marks for regular expenses) which last item includes: construction of roads, &c. 17.9 million marks,— fire and extinguishing apparatus, &c. 2.2 million marks. 13.2 million marks were devoted to the care of the poor, and 19.5 million marks to amortization of debts; other miscellaneous expenses amounted to 1.5 million marks.

On the other hand there was a revenue amounting to 29.8 million marks from private economic sources. This included 22.5 million marks profits derived from municipal works divided as follows:—gas-works, 6.9 million marks; water-works, 5.8 million marks; drainage and irrigation works, 3.1 million marks; cattle-markets, slaughter-houses, and meat-inspection establishments, 1.8 million marks; and market-halls, 1.6 million marks. In addition to this, 8.4 million marks are obtained by fees, 64.4 million marks in taxes (comprising 31 million marks in municipal taxes, 21 million marks in ground rents, and 8 million marks industrial taxes), 3.9 million marks from state and private contributions, 5.8 million marks from loans for public buildings, and 5.1 million marks assignments and transfers included as revenue in the Budget. If the 72.5 million marks working expenses for municipal works, which were eliminated from the first item, are included, this makes a total revenue of 190 million marks.



Public expenditure per head of population. In conclusion, details may be given briefly showing what the claim made upon the individual by the public expenditure amounts to per head of the population. The following are the figures for the po-

pulation of Berlin in 1903: The total sum annually demanded per head for the actual requirements of the state (not including the cost of working of Imperial state and municipal concerns covered by their own profits, which alone makes 96.55 marks per head) was 95.43 marks; the Empire claimed 21.93 marks, Prussia 21.15 and Berlin 52.35. These amounts are divided as follows:

Expenditure per head of population in 1903.

	Germany	Prussia	Berlin	Total
		ma	rks	
1. Army and Navy	17.00		_	17.00
2. Foreign affairs	0.78	0.01		0.79
3. Education, Science, Art, and Ecclesiastical				
matters	0.03	4.50	13.04	17.57
4. Agriculture, Industry, Commerce, Traffic,		į	i	
and general economic expenditure	1.34	5.39	11.33	18.06
5. Law and Police	0.03	5.17	2.73	7.93
6. Social economics and care of the poor	0.81	0.59	6.98	8.38
7. Public hygiene	0.03	0.14	8.91	9.08
Expenditure for certain public needs (total of 1-7)	20.02	15.80	42.99	78·81

	Germany	Prussia	Berlin	Total
		ma	rks	
Forward (total of 1-7) 8. General State and Administration expenses 9. Debt expenses (not including the Prussian railway debt, nor the profit earning debt	20·02 0·20	15·80 4·70	42·99 7·02	78·81 11·92
in Berlin)	1.71	0-65	2.34	4.70
Actual requirements of the State (total of 1-9)	21.93	21-15	52.35	95.43
10. Additional working expenses (including the cost of Prussian Railway debt and municipal profit earning debt)	8-13	42-48	45.94	96.55
Total requirements of the State (total of 1-10)	30.06	63.63	89-29	191.98

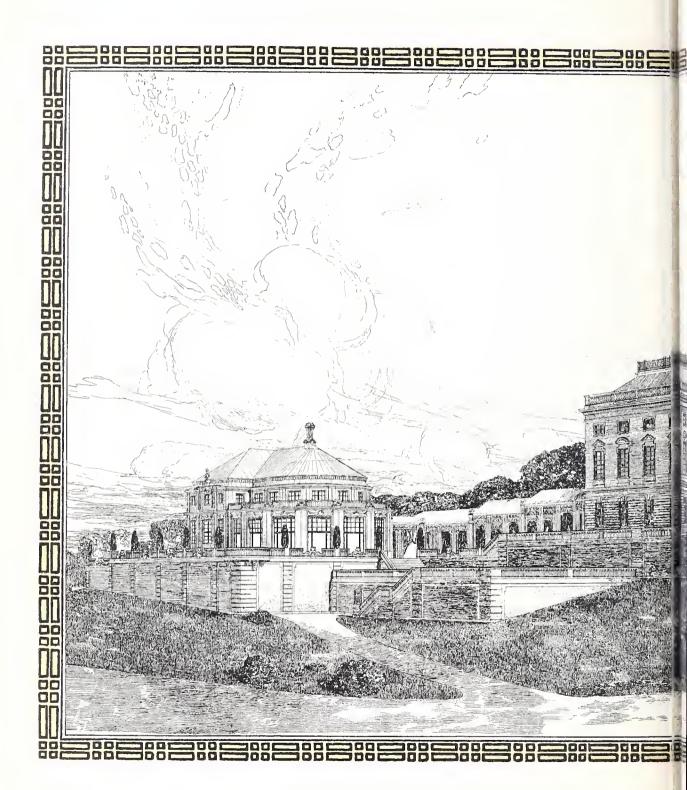
XXIII. The German Colonies.

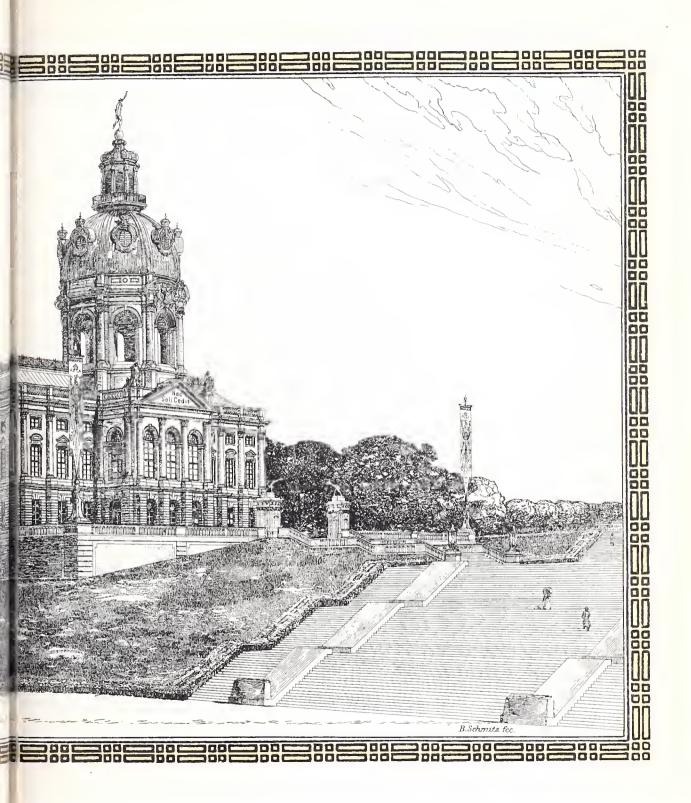
The following tables comprise the most important statistics concerning the German colonies:

Subject	East Africa	Cameroons	Cogo	South-West Africa	New Guinea	Caroline, Palau and (Darian Island	Marshall Islands	Samoa	Kiauchau
Area (1,000 sqkms) Population per thousand white settlers	995 6,847	495 3,500	87·2 2,500	835 200	239 380	2·08 50	0·415 15	2·57 33	0·552 102
(total number)	1,247 965	581 494	159 149		301 207	145 39	69 36	347 151	3,442 ?
in the colony. (Cestim., of 1903) Colored	232 1,699	101 900	7 150	826 ?	210	?	_	2 40	2,754 128
Railways (kms)	87	_		382	_		_		302
Revenue and Expenses 1903 in thousand marks Receipts	5,365		117	2,171 6,260 1,655	990 108 882 109 876	429 51 378 143 284	_ _ _ _	291	12,808 455 12,353 7,470 5,277
Foreign Trade 1902 in thousand marks Imports (total) ,, from Germany Exports ,, from Germany	8,858 2,065 5,383 1,521	13,276 7,6 6,264 8,0	59 4,194	7,229	2,211 1,010 1,121 300	39 96	88 92 64 72	2,398 584 1,692 ?	1902 1903 25,645 ? 8,909 ?

Ernst von Halle.

The plan of the site of the German State Building will be found on the back of the title page of the Exhibitors' list.











y command of His Majesty the Emperor, the German State Building has been erected so as to resemble the principal part of the Royal Palace at Charlottenburg. It stands like a historical monument among the edifices erected by the United States in the gigantic amphitheater of the Exposition, in a free and open space interspersed by flowing cascades. As

an exhibition building, it presents to the New World an embodiment of the renowned European civilisation of past centuries, while as the representative edifice of the German Empire, it is symbolic of the new lustre of the old Prussian Monarchy.

The Prussian crown has shone from the dome of the Charlottenburg Palace ever since it was erected; the Great Elector's son began the Palace while he was the Elector Frederic III. and finished it as King Frederic I.

He availed himself of the princely art of those days, which was dominated by the Court of Louis XIV. at Versailles. But in Brandenburg-Prussia this art assumed a characteristic form. The Charlottenburg Palace shows traces of international origin, while the Royal Palace in Berlin, the principal part of whose more antique decoration is reproduced in the "German State Building," owes its authoritative historical impress to a great German artist. In Germany architectural styles do not, as in France, bear princely titles to mark their dates. The voice of general culture classifies them. When they are named after persons, artists' names are chosen, and the right to this royal honour in German art was won by Andreas Schlüter, in the service of the first Prussian King. Thus the artistic type of the "German State Building" is of national value.

The task of its architect, Professor Bruno Schmitz, consisted in moulding this historical art-monument into a living work. From the Charlottenburg Palace he copied the whole appearance, the front and middle halls and well-staircases with the two principal saloons,—from the Palace in Berlin, one of ist most beautiful rooms for which Schlüter alone is responsible. In both these princely dwellings many works of art and collections of furniture have been

brought together. In the adjoining building containing the German wine restaurant, features of Schlüter's last and finest private work in Berlin are artistically made use of. This eclecticism was justified, for it represents the essence of German art during the transition period from the 17th to the 18th century. France and England have followed suit in the choice of their representative buildings, they having also availed themselves of historical artistic forms derived from former periods. They, however, could adopt patterns which are characterised by the uniformity of their ancient and for the most part national traditions. Such conditions are not known to the culture of art in Germany, and in the March country less than anywhere else. Slowly and painfully was the harvest gathered in. Vigorous growth was followed by stagnation and relapse, for the Chirty-years War came like a whirlwind and destroyed its finest germs. The next rise of art in Brandenburg-Prussia begins with that period in which the middle parts of the Charlottenburg Palace arose. It was a new beginning, partly supported by foreign aid; but the organising power which then manifested itself in such a measure in the domain of art had originated a generation before, and had been tested throughout all Europe with political and economical success. Its exponent was the Great Elector. With a strong hand Frederic William united the scattered possessions of the Brandenburg-Prussian State into a great national power. Time and means were lacking for much art culture, and buildings served rather for fortifications than for show. During the last ten years of his reign, however, a change began. His victorious arms were mirrored in art. This can be seen in a series of wall tapestries which decorate a hall in the upper story of the "German State Building." They were first executed in Berlin for King Frederic I., and were made on carpet looms of French origin from designs by Dutch artists, but the order for them was given as far back as 1686 by the Great Elector, and they commemorate his victories over the Swedes.

A similar connection between matter and form predominated in the art of Berlin on the eve of the monarchy. Its hero always remained the Great Elector, the princely designer was the future King, while the artists were mostly foreigners.

Similar conditions prevailed at the commencement of the Charlottenburg Palace, only there the powerful personality of the Great Elector somewhat yields to that of a charming princess. For this palace was a personal present of the Prince later known as King Frederic I. to his consort. It bears the name of the first woman who sat upon the Hohenzollern throne, who—as Frederic the Great says—"introduced social grace, true delicacy combined with love of art and science into Prussia", the friend of the philosopher Leibnitz, Sophie Charlotte.

In 1695, eleven years after their mariage, the Elector bought an estate for her, called Lütze, situated near the Spree "a short mile" west of Berlin. The first plan for the little country villa, built only to serve as a temporary residence, was probably that by Johann Arnold Nering, who at that time directed the building of the most important edifices in Berlin. He died,

however, in 1695, and yet as long after its inauguration as 1699 we find the mother of the Electress describing the part already inhabited by her as "only half finished." The oldest center part moreover—the "corps de logis"—which was supplemented at Charlottenburg by plain low additional buildings for the court officials, the "Officen" for the "Cour d'honneur," is shown at St. Louis otherwise than it appears at present. The main front at that time faced the garden. In an illustration contained in a description of the Palace written in 1702 but only published in 1706, the front only shows a flat dome springing from the oval projecting garden saloon. The architectural style of this garden front was however the same as it is now, and this prevails also in the present principal front turned towards the "Cour d'honneur." It follows the traditional school of the old Renaissance. Schlüter probably had a share in the formation of this old front, for in 1694 he entered the service of the Elector of Brandenburg as sculptor. His first labours were exclusively confined to sculpture, but after his return from a journey undertaken to Italy for the sake of study, he applied himself to building in Berlin. In the Zeughaus his art gave way to French classicism, but on the Royal Palace he has stamped the impress of his powerful individuality. The front of the Charlottenburg Palace, as seen to-day, and after which the "German State Building" is erected, was designed by Schlüter's colleague and successor, the master whom Sophie Charlotte herself called her "Oracle on building,"-Eosander nicknamed "Goethe." Born in Sweden, the latter obtained his artistic training in Italy and France. His mistress had also received the first impressions which formed her taste from the same source. At twelve years of age the intelligent princess, who was married to the Elector of Brandenburg before the completion of her 16th year, visited in the company of her mother the Court of Louis XIV. at Versailles. From that time the French language became to her the acme of all polite manners, and French art synonymous with art itself, only in music she preferred the Italian School. An epigram written at her estate in Lietzenburg says:

"qui regna d'Italia il dolce riposo; qui brilla di Francia la cara libertà."

From this twofold source then, that art was derived by which Eosander transformed the Palace of the Electress in 1701 into a residence worthy of the Queen. It was effected in a practical as well as striking manner by the round central chamber and its projecting gable which unites the whole building, and by the towering dome which majestically crowns the whole. The latter afforded at the same time an increase of space for its "Tambour." It is closed by windows, and forms a round chamber suitable for a vestibule. But the exterior of this cupola tower at Charlottenburg appears too heavy in proportion to the building underneath. This fault has been fortunately avoided in the "German State Building" at St. Louis by turning the windows into arcades from which Bochumer bells chime forth and the electric search-light disperses its rays. Nor is the effect of the newly added pictorial decoration on the whole frontage of the German house less favorable. Both the large

sculptured groups of figures on either side of the gable and the big shield over the centre "tambour" arcade, where the Charlottenburg castle shows only a plain clock, give the middle projection a far better base for the cupola. This was the more necessary because the building at St. Louis does not lie low as in Charlottenburg, but on a stately height. It has unmistakably gained by the exchange of the "Cour d'honneur" for a perron leading up to it, for the Charlottenburg palace was gradually and not without constraint adapted to the almost incomparable grand breadth of the French palaces. The German State Building in its compacter form, more according to German taste, is fully justified, especially by its high cupola, in towering over the exhibition city as a far seen and attractive object. But the significance of the national and historical style of the Charlottenburg Palace lies in its interior; it is there that it attains to that magnificence, designated in the language of art as "Royal." Five of the principal rooms have been reproduced in the "German State Building" viz., the two centre circular saloons, with the well-staircase, the "Oaken Gallery," and the "Tressenzimmer" (galloon room). The prevailing taste in these is the Italian, developed in Versailles, but within the widest limits. Single forms are defined in character by the active artificers of that period in Berlin, who, mostly schooled abroad, manipulated the wealth of forms of the French ornamental style according to their own independent fancy.

The artistic value of these rooms lies in their harmonious keeping; they gain a personal character through their grand plastic and through the paintings on their ceilings. The staircase is most imposing, the gently ascending steps leading in a three-fold spiral from the spacious area of the vestibule, the whole being lighted by a subdued reflection from the white The white stucco, only gilded here and there in well chosen parts, imparts an elegance and yet a solemnity to the place which gives it a distinct character without making it appear ceremonious or stiff. One feels that this staircase belongs to the dwelling of a Princess; the majesty of victories won by force of arms, at that period so often impressed by such places, yields here to the scepter of Apollo among the Muses. They are indeed present, painted on the ceiling in traditional forms leading us back to the pleasing art characteristic of Correggio and the Venetians. Likewise on the stucco, bas-reliefs of Hermes accompanied by troops of Cherubs wreathed with festoons of flowers, represent the four Seasons. Above the window-niches and on the wall reaching to the Cupola, these are joined by groups of musicmaking "fauns amourettes," and the walls beneath the arched stair-vault are decorated with emblems depicting the arts of peace.

The whole decoration with its delicate bas-reliefs and lines depicting the figures in life-like and free and airy, but never obstrusive porportions, dates from the French school of the period.

In the "Oaken Gallery," traditions of German home art prevail to a greater degree. This room served as a dancing hall, but by reason of its great length resembles a gallery. As its name implies, this type of room took its

rise from the Italian Renaissance-Palaces. But there it served solely for monuments, whereas in the French Palaces for royal state. On German soil even these long outstretched saloons convey some idea of comfort on account of the parquetted wainscotting.

Here the panelling of the walls is in oak, and the combination of brown with the gold of the carvings, according to German taste. Pilasters and panels give the walls a quiet tone, while the richer play of form is confined to the upper terminations. Here North German feeling found expression in natural. moving, living forms, particularly in the crowns and finish of the picture frames. But also in the portraits of Frederic I. and Sophie Charlotte which decorate the gallery, and in the frames of the wall-niches which enclose mythological scenes above the mirrors, the precision of French decorative art, as seen prevailing in the lower parts of the walls, in the principal cornices and doors, is interrupted by a fresh feature. It is remarkable that all these parts show the Prussian Eagle, and everywhere in a natural position. with outspread wings? At Charlottenburg the flat vaulted ceiling is only white; at St. Louis it will be ornamented with paintings corresponding to other ceilings in the palace, especially with those of the Dutchman Peter de Coxi. Through rich colouring and its being greatly widened, this saloon will be the most elegant in the "German State Building."

The "Tressensaal" (galloon room) at Charlottenburg belongs to the magnificient suite which opens on the garden side, and combines the best methods of decoration for a princely and yet homely dwelling room of that period. In spite of the pilaster divisions the flat surface prevails. This is due in addition to the mirror panelling, to the hangings of purple silk on which gold bands or tresses are sewn in bold outlines. This style, which has been revived lately particularly in Austria, was then customary for ornamenting beds of State, and the pattern itself reminds one, as also the grotesque figures in the door and mirror wainscotting, of the sketches of Berain and Mardt; but their employment as wall decoration, and the graceful outlines of the folds betray North German art. The carvings resemble those of the "Oaken Gallery." Here also the Prussian Eagle appears everywhere, beside the horse in the Hanoverian arms and the sign manual of Sophie Charlotte. The numerous candelabra restored in bronze and gilt, have a beautiful effect on the purple back-ground. These and the furniture consist mostly of pieces lent by Royalty, manufactured in Germany about that time. And thus these halls in the Charlottenburg Palace, like the German poetry of that period, transmit unaided in their natural language strange lessons of harmony and rhythm.

Through Schlüter's genius, meanwhile, powerful works full of imperishable beauty were produced; the equestrian statue of the Great Elector near the Palace bridge, and the series of masked dying warriors on the Zeughaus bear witness to this. Nor is Schlüter's art quite absent in the Charlottenburg Palace. His spirit is apparent in the four large "bas-reliefs," which are

let into the walls of the round saloons. They were designed in the antique, but carried out in the fullness of form of Rubens. They show in classical and allegorical style the influence of Brandenburg's Electors—probably Frederic l. and Frederic Ill.—on the civilisation of their country. Their style resembles in the freshness of its picturesque composition and in the firmness of the individual figures the reliefs on the pedestal of the Elector's monument. And outside, at the entrance to the palace courtyard where the pair of gladiators copied from the Borghesian model advance their shields as if to protect the peace of the house, the sentry-boxes which serve as their pedestals betray by their massive compactness the hand of Schlüter, as also the decorated frieze of the Berlin Zeughaus with the vigorously portrayed figures of dying warriors, reduced in size, but losing none of their inward grandeur. But these are only isolated examples of Schlüter's wonderful art. They pale before the splendour with which he surrounded the young Prussian Crown in its home, the Hohenzollern Palace in Berlin. Out of a composite edifice consisting of various disjointed buildings standing side by side, of the old Margraves and Electors, he erected a royal palace which even in its present, [according to Schlüter's plan] unfinished form, is, as a residential seat of the German Emperor, unsurpassable in majesty and architectural style. After this work, Schlüter was advanced from "Court sculptor" to "Director of the royal Palace." Thus he is named in the new patent of the 2nd Nov. 1699, and from that date to the Summer of 1706 he spent his whole energy on the building of this palace. In the first two years his efforts were strained to their utmost, for Schlüter's work had to keep pace with political events, and the king had expressed his wish to enter his new Palace in Berlin on the 6th of May, 1701, after the coronation in Königsberg on the 18th of January. and to enter at the triumphal gateway riding past the equestrian statue of his father, which represents the latter as a Roman Conqueror. The inner apartments were also to be royally decorated for his reception, above all the great state chambers in the second story. And they were ready in their main points; they have remained, except for a few supplementary alterations, almost unchanged ever since, as the chief place in which the might and glory of the German Empire are reflected in its solemn as well as its festive ceremonials.

This was a more excellent performance for rapidity of execution than the whole princely art of Europe at that time could have shown, and it was accomplished mostly by native labour in the small city of Berlin, which had

till then supplied her artistic requirements from foreign sources.

It was a happy thought to memorialise this great achievement in the history of art, in the "German State Building." One of the last, and doubtless most beautiful pieces of decorative art in the "State Chambers" of the Berlin Royal Palace, has been faithfully reproduced at St. Louis. It is the ceiling of the "Red velvet Chamber," which now, set apart for the Black Eagle order, leads into the former Chapel. At St. Louis, instead of the fireplace, this room contains a glass case in which are the principal pieces of plate presented to His Majesty the Emperor by a hundred towns on the occasion of his marriage in 1881.

No part of the internal decoration shows the fine traits of Schlüter's art better than this ceiling. Nowhere are the three sister arts more harmoniously combined: Architecture, which in bold perspective apparently carries the wall on into the ceiling, turns the stiff right angle into moving surfaces projecting pillars and concave circular niches; Painting which raises this airy architectural bas-relief scaffolding to the open-work centre, conjures classical deities into its interstices, and enwreathes the middle point with a row of figures; above all, Sculpture which assumes in stucco the most multiform shapes, from the bas-relief to the statue, from life size to miniature. Here one must acknowledge that Schlüter's fancy dominated all expressions of decorative art, and that in this whole work there is no line or form which had not his approval. The majority of them came doubtless from his own hand. It is also to be seen that plastic art was his chief talent. The great statues of ideal feminine forms and the hovering cherubs in the corners, the two oval medallions and the two winged figures under them, pleasing counterparts of the heads in the Charlottenburg quard-houses, all these bear testimony to Schlüter. But also in the wavy outlines of the balustrade bas-reliefs, and in the designs of their two center panels under those medallions, sculptural thoughts and technique prevail, as in all the ornamentation; the emblazoned cartouches, the winding volutes, the boldy formed vases, garlands, wreaths and shells, and the rich horizontal mouldings everywhere, all have the picturesque fullness of the Baroque forms, refined by plastic taste.

Its contents stand as a sign of the period during which flowery and pompous language, derived from antique and classical sources, was freely made use of. When a Prince was to be praised, he was called after the Olympian Divinities, and living powers were incorporated in the forms of classical myths. Thus the rotation of day and night is depicted in the large pictures of this ceiling by classical divinities. Aurora hovers before the rising sun, scattering roses, followed by torchbearing cherubs, while Luna opposite in the constellation of the Great Bear, threatens Mars and Venus with her bow and arrow; as a counterpart, Night appears with her sleeping children, then the dewy morning hour before the dawn, and Mercury beside Neptune, representing trade and navigation. In the rows round the center aperture are entwined Bacchantes, Fauns and Nymphs; in the midst of this lively dance a skeleton moves. In the bas-reliefs of the balustrade, troops of antique Gods and Goddesses are passing by. Culture wrested from the strife of the elements is symbolized by Neptune driving between river gods across the sea, Helios guiding his sun steeds, Cybele her lions, Diana her stags and Juno her peacocks; while Zeus, borne aloft on his eagle, hurls his thunderbolts against the shapes of darkness. Flora caresses Zephyr, and Apollo accompanies the Muses. These are repeated, wonderfully painted, as counterpieces to the Graces and Horæ, on the golden ground of the two square plagues. This world of figures is grouped together, however, only for the glory of the new king, for in the center picture jubilant cherubs crown his sign manual, while the geniuses on the balustrade bow over his escutcheon.

The artistic freshness of the whole is heightened by its execution. The urgent haste led to bold means being used. The prevalence of white or gilt stucco was conventional in rococo ceilings, as well as the imitation by painting instead of bas-reliefs; the realistic effect of paste-board and glass in the middle frieze is very original; glass-plates are fixed on the reddish dyed plaster, and on these figures cut out of gilt paste-board have been laid. The natural looking flowers springing from the corner vases are also made of paste-board, and many other pecularities of this work have made it a durable and festive monument. This ceiling was therefore all the more appropriate for the temporary State-building in St. Louis. It brings with it the full charm of Schlüter's art, which is here no less national than are the decorations of Le Brun in the palace of Versailles.

Schlüter's style also characterises the adjoining Gobelin saloon of the Berlin palace, and is continued in the reading-room on the ground floor, whose walls within their pilasters and niches have been copied from the so-

called Swiss Gallery in Berlin.

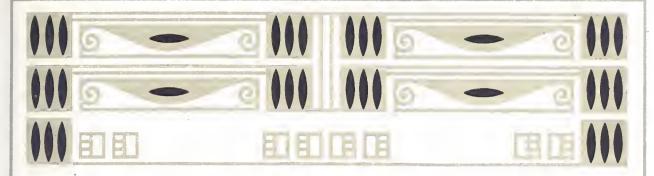
The Restaurant connected with the principal building in the German State Building by a leafy walk, is also after Schlüter. Its pattern, taken from his last Berlin building, a villa in the Dorotheenstrasse, erected in 1712 for the Minister of State, Bogislaw von Kamecke, now the Club house of the Royal York Lodge of Freemasons; it is a graceful structure which appeals to those who enjoy material pleasures in a Restaurant. Here however only a few ideas have been borrowed from Schlüter's art, and indeed the fundamental design of this hall as well as its decorative variations have been freely invented. But German art as it is to-day, speaks from the historical part of the "German State Building." Even where this present-day art only faithfully copies, it joins its technical capability to that of the past where it works independently, but employs past styles, and endows them with new value. In these rooms Germans encounter welcome memories of historically well known forms.

The Great Elector has paved the way for them; they march forward through comparatively peaceful times, and are the first in the rude "Mark" to sun themselves in the beams of a refined civilisation and in the splendour of youthful majesty. It is significant that in Charlottenburg a royal lady took the lead. In the person of Sophie Charlotte rare contrasts are harmoniously combined to an unusual degree. She was beautiful enough to pass for the fairest of the fair with Peter the Great and the French ambassador, intellectual enough to inspire Leibnitz with his Theodicee and to give a pleasing turn to the rough jokes so much in voque in her time. Her "Lützenburg" become a "Lustenburg;" and yet there amidst the gay festivities the plan matured to which the Academy of Arts and Sciences in Berlin owes its existence. She liked to live "sans façon," and was even called "la reine républicaine," but she was not averse to display when it imposed no constraint upon her. So did Sophie Charlotte shed the lustre of intellectual freedom and elegance over the ceremonial splendour of the Prussian crown, in accordance with the motto borne by a memorial coin of hers:

"Mon devoir fait mon plaisir."

These were also the sentiments of her princely consort. History placed
Frederic l. between two truly soldierly men, who in their iron energy over-
-looked the attractive appearance of things. He loved the latter excessively, not
only because it lay in his character, but also because the times demanded it
of their princes, and because his country had become inclined for it. And
that Frederic I. understood how to develop the idea of princely craft derived
from the Court of Louis XIV. not only as being suited to his own wishes but
also to the resources of his country, history has amply confirmed. His
patronage of art raised industry and trade to a height proportionate to the
existing international scale, and strengthened its international growth on
native soil. Its lasting influence for improvement permeated all forms of life.
And what Leibnitz did for the Queen, Schlüter did for Frederic l.; two German
men whose names resound even to-day far beyond German borders
The next period during which Prussian art flourished after Schlüter had
passed away, came a century later under Frederic the Great. France too, and
not the Mark was then its original abode, and yet it formed the most impressive
decorations of the "German House" at the Paris International Exposition of 1900.
The importance of this "Friderician" art is however not due to the artists
who shaped it, but to the king who stamped it by the greatness of his own
personality with its chief historical features. Pesne's picture of him as
a child is the only reminiscence of the monarch once styled "unparalleled,"
in the German State Building at St. Louis.
Two centuries have confirmed the significance of the Prussian sway
for Germany for the existence of nations.
That which Frederic I. anticipated as a brilliant semblance has received a
universal historical impress; on the tower of the Charlottenburg palace façade at
St. Louis the German Imperial crown floats over the Prussian arms. Its present
wearer, in desiring for this building the artistic style of the ages of his royal
ancestor, did so with the joyful claim of an heir to his rightful privileges.
Alfred Gotthold Meyer.
Description of the German State building.
The representative building of the German Empire as well as the German
Wine Restaurant have been built according to the plans of Professor Bruno
Schmitz, of Charlottenburg; the local management of the building arrangements was entructed to Harr Alexander Budeless enclined and during the
ments was entrusted to Herr Alexander Rudeloff, architect and during the
further course of the work to Herr Wilhelm Brurein, architect. The erection of the building in the rough was carried out by Messrs. Boswau and Knauer
Limtd. Berlin.
The main building covers an area of 930 sq. metres, is 46 metres long,
and 21 metres wide; the ridge of the roof is 18 metres, and the topmost

The ground-floor comprises a large reading room in addition to the circular entrance hall and various offices and exhibition rooms; the upper stories consist of reception rooms. At the south end of the middle hall is situated the chief reception room. the "Oak Gallery," and adjoining it there are two smaller apartments, the "Galloon room" (Tressen-Saal) and the "Brandenburg Chamber." A door leads from the latter to another large apartment, in which the celebrated Berlin Gobelins from his Majesty the Emperor's collection are exhibited. The main building is connected by an arboured walk with the German Wine Restaurant. This latter is 25 metres long, 19 metres wide and 15 metres high, and contains a total space, including cellarage, &c., of 6,246 cubic metres. Special services have been rendered by the following firms who supplied fittings, &c., for the decoration and embellishment of the building, free of charge: Julius Bluethner, of Leipsic, a grand piano in the upper hall; the "Bochumer Verein für Bergbau und Gussstahlfabrikation," cast steel bells in the tower; Hugo Bremer, of Neheim, "Bremer" lamps; the "Delmenhorster Linoleumfabrik," wall-hangings and floor-coverings; the "Deutsche Linoleumund Wachstuch Co.," of Rixdorf, floor-coverings; the "Deutsche Steinindustrie-Aktiengesellschaft," a marble table in the entrance hall; H. C. E. Eggers & Co., of Hamburg-Eilbeck, the wrought bronze balustrade in the entrance hall; H. Frost & Söhne, illuminating fittings for the Brandenburg Chamber and the Gobelin Hall; August Gerber, of Cologne, 20 busts of celebrated German personages, and 12 busts of German Princes in the Oak Gallery: Gladenbecks Bronzegiesserei in Friedrichshagen, Inhaber Walter, Hermann und Alfred Gladenbeck, two cast bronze feet for flagstaffs, after designs of Prof. Chr. Behrens for the Friedrichsplatz at Mannheim; Rudolph Hertzog, of Berlin, all the window curtains, stores and lambrequins in the main building as well as the two large flags before it; the Königliche Porzellanmanufaktur of Berlin, different articles of porcelain in the reception rooms; the "Aktiengesellschaft Lauchhammer," of Lauchhammer, a fountain group "Abend," in the garden, designed by Prof. Kuno von Uechtritz; the Regina-Bogenlampenfabrik Cologne-Sülz, arc lamps; J. Rochlitz of Berlin, tower clock with automatic electrical winding apparatus; the Siemens-Schuckert Co. Ltd., of Berlin, electric search-light in the upper chamber of the tower; Villeroy and Boch, of Mettlach, the tiles of the verandah and terraces of the main building: Weber-Falckenberg, of Berlin, fireproof linen awnings in the arboured walk; W. Ziesch & Co., of Berlin, Gobelin coverings for the upholstered furniture manufactured by Kimbel & Friedrichsen of Berlin. Lorenz.



GERMAN EDUCATIONAL MATTERS.





n order to understand and appreciate the peculiar character of German educational matters, we must not only consider their historical development, which took many hundreds of years, and the natural connection of all the various forms of education, but must also make ourselves familiar with everything connected with the study of teaching and learning. This cannot

be realized at an international exposition, because, apart from the cost and range covered by such a representation, neither the actual instruction itself nor its historical development can be directly shown. However, according to the experience gained from the exhibition of German educational matters at Chicago in 1893, we may hope that it will be possible, within the given limits, to bring home to the large number of visitors to the Exhibition the forms taken by our educational system as a whole, as well as the methods employed and the results obtained thereby.

It is quite impossible to investigate this complicated system without the assistance of written works. An attempt has therefore been made for the first time by Prof. Lexis, of Gættingen, with the co-operation of a number of professional men to set forth concisely in his book "Das Unterrichtswesen im Deutschen Reich," all branches of education as developed under the direction of the separate Federal States.

Accordingly the exhibits comprised at the Exhibition of German Education must only be taken as a selection of typical representations intended to symbolise German methods in their entirety. No sort of completeness could of course be aimed at, and it appears all the more justifiable to lay special stress upon a more thorough representation of particular branches than was done at the Exhibition of German Education at Chicago, in which, as many visitors to the present Exposition will remember, more care was taken to give a general idea of the whole than to go into a detailed consideration of separate branches of education.

The intimate connection of the various stages in the educational system from the Peoples' and Higher Schools to the Universities, Colleges and Schools for special branches of Technology, is of great importance for understanding German

methods. By means of the University and the colleges connected therewith,—which besides instruction also give opportunities for research,—German education is directed towards the highest aims of science. For this reason we must not omit to represent the German academies of science at the Exhibition among the principal types of our educational institutions as an embodiment of the organisation of scientific work. Foreign countries have constantly paid considerable attention to these academies as well as to German universities and technical colleges on account of their peculiar development and organisation. It is therefore natural that they too should be placed at the head of the following treatise.

It may be added that natural sciences and medical science with the educational establishments connected therewith, claim a far larger proportion of exhibits than the humane arts and sciences. The exhibition of the German Universities and Technical Colleges has therefore been obliged to keep the natural and medical sciences of Chemistry, Physics, Astronomy, Zoology, Botany, and Medicine distinctly view among the many branches of knowledge which fall within their domain. This is shown in the following special articles. Although, however, the humane sciences are apparently put in the back-ground of the German University exhibition, a glance at the collection of publications issued by German Academies which fills the "Ehrenhof" or "Court of Honour," dispels any impression that these branches of German Science are at all neglected or behind-hand. The specimens shown in the "Court of Honour," from the excavations at present being carried out by German scientists in the Saalburg, Babylon, Baalbeck, &c. and in no lesser degree the full-sized photographs serving for the purpose of instruction in artistic education, may be cited as proofs, in special branches, of our statement above. Here, too, however, full appreciation can only be gained by studying the comprehensive work regarding the German educational system previously mentioned. In this book the work of the German Universities in these branches is also thoroughly discussed, and all information desired in the other matters connected with our educational establishments can be gathered from it.

2. Universities, Technical Colleges and other Scientific Institutions.

A. General Survey.

a. Academies of Science and Universities within the German Empire.

The Universities of Germany do not merely serve for acquiring the highest education in scientific matters; they are at the same time centers for independent research. Their libraries, laboratories, collections, observatories, &c. are consequently not only fitted up to meet the requirements of students, but are intended to offer to instructors and young experimenters alike the means and assistance for furthering science in all its branches. This

sphere of university activity finds an important supplement in the work of the Academies, especially of learned societies which are organised and supported by the State, where the most prominent members of the particular sciences meet together. The Academies, as such, are neither instructional nor experimental institutions, but centers at which the results of research are collected; they are a powerful incentive to fresh experiment, and organise wide reaching undertakings which are beyond the power of a single individual; they also guarantee pecuniary assistance for carrying out expensive work, and render possible the publication of material which it would otherwise be extremely costly to make public.

The State Academies within the German Empire (the numberless private learned societies, some of which partly enjoy State support, do not come under consideration here) are all situated in University towns. They are intimately connected with these Universities owing to the fact that their ordinary members are for the most part professors at the University. Berlin on the other hand, the ordinary members of the Academy have the right to deliver lectures at the University, even when they are not professors. The following is a list of the Academies:—In Prussia:—1. The Royal Academy of Science in Berlin, founded 1700. It has a physical-mathematical side and a philosophical-historical side numbering 60 members in all, as well as foreign, corresponding and honorary members. Its yearly expenditure, apart from the revenues from numerous bequests connected with the academy, amounts to 281,000 marks. 2. The Royal Society of Sciences, in Gottingen, founded 1751, which has a philological-historical side and a mathematical--physical side, each consisting of 15 members, besides foreign, corresponding and honorary members. Annual revenue 27,600 marks.

In Bavaria: The Royal Academy of Sciences founded 1759, at Munich, comprising a philosophical-philological side, a mathematical-physical, and a historical side. Annual revenue 80,000 marks. In connection with the Academy is the General Conservatoire of State Scientific Collections, to which

most institutions of the University belong.

In Saxony: The Royal Society of Sciences at Leipsic, founded 1846, with a mathematical-physical and a historical-philological side. It receives an

annual State subsidy of 20,000 marks.

The immediate purpose of the Universities continues to be the giving of instruction in the sciences, although University professors are expected to contribute towards further progress in sciences. The learned professions for which they prepare according to old tradition, are Theology, Jurisprudence, and Medicine, and in these three branches instruction is given by the three corresponding faculties, which were once designated the "upper" faculties. Besides these there also exists, a philosophical faculty which originally in its calling of a Faculty of Arts (Artistenfakultät) had the task of preparing students for entrance to the upper faculties. At the present day, however, the range of learning of the philosophical faculty embraces the entire field of science which lies beyond the range of the above mentioned practical pro-

fessions. The philosophical faculty has also in turn become a preparatory institution for certain branches of the professions which have developed independently of recent years. Such, for example, as the callings of teachers in the higher schools, both of languages and mathematics, of mathematics and natural science, and of certain technical branches such as chemistry, agriculture, at some Universities forestry, and quite recently for professions requiring a special preliminary training, in political economy and science. Besides this, however, the students belonging to other faculties find in the philosophical faculty the necessary auxiliary scientific instruction for their profession or branch. (Dedical students in particular receive their training in natural science in this faculty. Owing to the unusually wide field covered by the philosophical faculty, one can understand how it is that where it has retained its wide scope it requires in itself the services of more professors than all the other faculties together. At some Universities, therefore, it has been considered desirable to split up this faculty into two branches, a historical-philosophical faculty and a mathematical-natural science faculty. The former has kept the title "philosophical." At other Universities two sections have been formed which have only certain points in common. In Tübingen there is also a special political-science faculty, and in Munich a special political-economic faculty.

The principal representative of the University is the Rector, who is elected to hold office for one year by the regular professors (at some Universities by the other professors as well). His appointment is subject to the sovereign's approval. The business of the various faculties is transacted by the Deans, who are also elected by the regular professors of each faculty to hold office for one year. The body of scientific instructors consists of regular professors, extraordinary professors and private tutors. Besides these there are the lecturers and assistants. The students matriculate at the University, and are enrolled in one of the faculties. Only those can obtain the full rights of matriculation who have as leaving certificates from one of the nine classes of higher educational establishment ("Gymnasium," "Real-Gymnasium," or "Upper-Realschule"). Foreigners have to produce a certificate of a corresponding standard. Students can also be enrolled in the philosophical faculty under rather less strict conditions by means of the so-called "small matriculation." Besides this certain branches admit "Listeners." Female students have up to the present been allowed to matriculate only at certain Universities, and then only provided that they have the proper certificate. The majority of Universities only admit them as listeners.

All the faculties confer the degree of doctor upon certain conditions, and the theological faculties also confer the lower degree of "Licentiate." The securing of such a degree is not, however, the practical aim of a person studying at a University, for there is no State privilege connected therewith. Besides the purely academical examinations for the degree of doctor, there are also State examinations for the principal professions, and ecclesiastical examinations for the theological faculty. To be admitted to the theological, legal, or higher grade teachers' examinations, it is necessary to be able to prove a

course of study of at least three years as a fully matriculated student. For the medical profession the period of study has been lengthened to five years. The following is a list of the Universities within the German Empire. In Prussia: 1. Berlin, founded 1809; four faculties (theological faculty only Evangelical). 2. Bonn, founded 1818; five faculties (theological faculty Evangelical and Roman Catholic). 3. Breslau, originally founded 1702; refounded 1811; five faculties (an Evangelical and Roman Catholic theological faculty). 4. Gættingen, founded 1737; four faculties (theological faculty only Evangelical). 5. Greifswald, founded 1456; four faculties (theological faculty only Evangelical). 6. Halle, (united with Wittenberg), founded 1694; four faculties (theological faculty only Evangelical). 7. Kiel, founded 1665; four faculties (theological faculty only Evangelical). 8. Königsberg, founded 1544; four faculties (theological faculty only Evangelical). 9. Marburg, founded 1527; four faculties (theological faculty only Evangelical). 10. Munster in Westphalia, founded as an Academy in 1771 and as University in 1902; four faculties (theological faculty only Roman Catholic).
faculties (only a Roman Catholic theological faculty, and a special political
science faculty). 2. Wurtzburg, founded 1582; four faculties (only Roman
Catholic theological faculty). 3. Erlangen, founded 1743; four faculties (only
Evangelical theological faculty).
In Saxony: Leipsic, founded 1409; four faculties (theological faculty only
Evangelical).
In Wurtemberg: Tubingen, founded 1477; seven faculties (an Evangelical
and Roman Catholic theological faculty, and special natural science and po-
litical science faculties).
In Baden: 1. Heidelberg, sounded 1386; sive faculties (theological faculty
only Evangelical and a special natural science faculty). 2. Freiburg in Baden,
founded 1457; four faculties (only Roman Catholic theological faculty).
In Hessen: Giessen, founded 1607; four faculties (only Evangelical theo-
logical faculty).
In Mecklenburg-Schwerin: Rostock, founded 1419; four faculties (only
Evangelical theological faculty).
In Saxe-Weimar: Jena (supported partly by the three Duchies of Saxony),
founded 1558; four faculties (only Evangelical theological faculty).
In Alsace-Lorraine: Strassburg, founded in its present form in 1872;
six faculties (an Evangelical and Roman Catholic faculty and a special mathe-
matical natural science faculty).
Besides these, there are in Prussia the Lyceum-Horianum in Braunsberg
for the education of Roman Catholic Theologians which ranks officially with
the Universities.
In Bavaria there are eight Lyceums which were founded for the same
purpose. In Prussia there are, moreover, six training colleges for Roman
Catholic theological students, and one in Alsace-Lorraine and Hessen.
Dr. Loxis

b. The Technical High Schools of the German Empire.



The rise of the Technical High Schools of Germany. In 1813 and 1815, after the struggles from which the German States had regained their independence, the economical condition of Germany, in consequence of the stormy times of the devastating Napoleonic Wars had fallen to the lowest ebb. In England at the same

time the steam-engine had begun its triumphal progress by opening up that countrys' riches of iron and coal. At that time the German States had only a thin population, which, owing to the undeveloped state of commercial industry, derived a naturally limited income from agricultural pursuits.

It was recognised that Germany was only to be economically raised by the expansion of her industrial activity. Two ways led to this end,—the practical, taken by pioneers like Krupp, Siemens, and Borsig, working quietly but uninterruptedly to replace the former handicrafts by an organised industry, and the theoretical way adopted by the Governments, of placing industry on a scientific basis by the erection of Technical Schools. That permanent progress in competition with other countries could only be made on such a foundation is proved by the recent developments in technical chemistry and electricity and heat-engines in Germany.

The beginnings of the German Technical High Schools were not surrounded by the festive splendour which shed such bright light on the founding of the Universities. Almost all the Technical Schools out of which the present Technical High Schools have risen were originally Middle-class Schools; and only when they had by continuous effort gained an important position, did they obtain the charter of a High School in the second half of the nineteenth century. The accompanying sketch represents better than words the course of the development of the High School. The origin of the High School in Berlin is marked by the fact that it grew out of the union of the Architectural School (founded 1799) and the Commercial Academy (1821).



Aim of the Technical High Schools.

This aim is clearly expressed in the first sentence of the constitutional statutes of the Technical High School in Berlin: "The aim of the Technical High School is

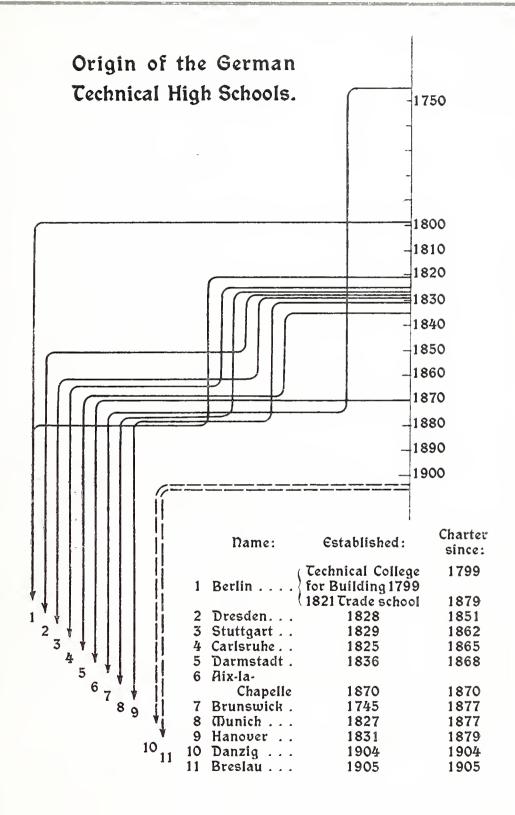
to afford a higher education for the technical professions in the civil and public service and in commercial undertakings, as well as to cultivate Arts and Sciences in so far as they come under the head of Technical Instruction."

Both teaching and independent scientific research are therefore aimed at; the lecture-theaters, drawing-halls and laboratories serve for teaching purposes, while in the laboratories scientific research is also prosecuted.



Organisation of the Technical High Schools. Each Technical High School has departments for separate studies, and in each are divisions for architecture, building construction, engineering, chemistry and mining, natural sciences and mathematics. Besides

these some schools have special departments, as Berlin and Danzig for ship-



-building, Karlsruhe for forestry, Munich for agriculture, and Brunswick for pharmacy.

The division into separate departments guarantees a greater thoroughness of instruction, while the union of the Heads of Departments in the Senate secures a united intellectual aim.



New Regulations during the last ten years.

The sudden development of technology has rendered new and comprehensive regulations necessary in every branch: they can only be slightly sketched here. In architecture, the founding of special professorial

chairs for town building, partly to meet the advanced technical demands for town buildings, and also to secure that the long neglected artistic point of view should he kept in mind when building not only a single edifice, but a whole city. The erection of conservatories for ornamental botany is specially taught in Berlin and Danzig. In building construction and engineering: introduction of laboratory instruction, opening of laboratories for hydrotechnics, for iron constructions and measurements of earth pressure, Dresden and Berlin. In Machine Construction: the fitting up of laboratories for the same and of large electro-technical Institutes. The building of testing stations for water-power hydraulic machines, needed from the rapid increase of late in the use of water-power, Dresden, Darmstadt and Berlin. Ship-building: the fitting out of an extensive establishment for testing the resistance of models of ships by towing, in Berlin. Chemistry and mining: development of electric chemistry, in Aix-la-Chapelle. The preparation of more thorough expert instruction for working mines and treatment of iron. Technical Administration: the giving of special instruction to such engineers as intend to take over the management of large technical works or communal stewardships. A comprehensive technical education forms the foundation in these cases, while a special study is made of law and administrative science.



Exhibition of the Technical High Schools.

An Exhibition can only be made of the form, not of the contents of instruction. The photographs taken of work done in the laboratories, as represented in some pictures, give only a faint idea of the restless

activity pulsating through these places. One cannot measure the results of the instruction by drawn plans; this can only be gauged by what former students, now practical engineers, create in practical life as the outcome of the intellectual nature of their instruction. What is exhibited must then be looked on only as the outer shell of this work.

Kammerer.

B. Scientific Chemistry in Germany.

The amount of work done in Germany in the field of chemical science and technology is enormous, but the great results which have been and are being daily attained by the latter are principally due to the fact that technology is most intimately by-related to science. Science can dispense with

technology, although at the moment it derives great help from it, but the technology of the present day is inconceivable without science. Many years passed before the efforts of Liebia, the founder of modern chemical research and instruction as it exists in Germany to-day, called into being a sudden practical growth of the industries, and since then the industries have been constantly gaining incentive and assistance from the progress of science. The chemical industry engages in its works and laboratories the services of a great number of highly trained chemists, whose business is to examine scientific discoveries as to their technical value and turn them to account industrially. The development of this industry is, therefore, entirely dependent upon the excellence of the seats of learning. This being so, we will give our attention for a moment to their organisation throughout Germany. Chemistry is taught at every university and technical Chemical college, at a number of mining academies, agricultural Instruction. colleges and schools of forestry. There are also special schools which give instruction in such particular branches of chemistry or chemical technology as dyeing, ceramics, and fermentation. The division of the instruction and course of study in chemistry is very similar at the Universities and Polytechnics. They are still principally based upon the well tried methods of Liebia. Preparatory instruction in chemistry is not made a condition for commencing study at any of the colleges, for at most German Grammar schools this science is only taught in most elementary form. The course of instruction commences by the novice becoming acquainted with the general reactions of different substances, and then with qualitative and quantitative analysis, and volumetric analysis of gases. As a rule four "semesters" (2 years) are spent in learning these subjects. The student then goes from the inorganic to the organic department of the laboratory, where he spends one or two "semesters" in becoming an adept in making organic preparations and in the analysis of organic substances. This concludes the actual training of the student for a chemist. In the majority of cases, however, the young chemist undertakes the writing of a scientific treatise for the purpose of securing a doctorate. The theme of his treatise is selected for him by one of the professors under whose quidance he has to carry out the work. Besides doing all this practical work in the laboratory, the student is also bound to attend a number of lectures delivered by the professors. The directors of nearly all the laboratories in German colleges have formed themselves into a Union, the aim of which is to regulate the chemical instruction throughout the country upon a standard system. In order to put this into effect, an examination, the so-called Union Examination, has been instituted for students; it is held after the 4th-6th semester, and in it the student is required to show a knowledge of general and inorganic analysis, and analytical and organic chemistry. Closely connected with this course of instruction is the free, independent research of the tutors at the colleges. Chemical Research. To-day, just as formerly, it is considered indispensible

that the professor should perform research work, for it is assumed that only by this means will he be able to stimulate the younger generation by his example, and at the same time teach them to exercise their inventive faculties. This successful two-fold activity of research and instruction forms the basis of the development of German chemistry. We will now turn to the most recent results achieved by chemical research, particularly in connection with the chemical department of the Education Exhibition.

Universal Chemistry. Universal chemistry has made enormous strides owing to the activity of physico-chemical research. Experimental research as to the general properties

of matter, especially those of dilute solutions, has presented science with a bounteous store of fruitful material. Owing to J. H. van't Hoff's pioneer labours, which began in the year 1885, it has been discovered that the state of a substance in dilute solutions is similar to the gaseous state, and that Boyle's and Gay Lussac's law of gases, as well as what is known as Avogadro's Law, also hold good for dilute solutions if osmotic pressure is substituted for gaseous pressure. Research work in the physiology of plants, such as that of Traube, de Vries, and particularly Pfeffer, offered an inducement to a closer investigation of osmotic pressure, which Pfeffer succeded in actually measuring in his clay cell provided with a diaphragm of copper ferrocyanide. According to his experiments it is found that dissolved substances exert the same osmotic pressure in solution as they would do in a gaseous state at the same temperature and in the same volume.

One result of this theory was the conception of a new method of determining molecular weights by lowering the freezing point and raising the boiling point (Raoult's and Beckmann's methods).

Whilst the properties of the atom and molecule in solution were being thus studied, the further development of the methods hit upon by Victor Meyer, performed by means of displacement of air, rendered it possible determine the molecular weights at extreme temperatures, (H. Biltz) and gave a natural explanation for phenomena which had hitherto been considered inexplicable. This method has been carried still further by Nernst, who determined the vapour density of metals by using an iridium bulb and an electrically heated furnace, while for weighing very minute quantities of metals it was necessary to use an extremely sensitive balance constructed of fine quartz filaments.

With the help of these various discoveries the theories of the dissociation of gases and of the electrolytical dissociation of salts in solution were further developed. All methods based upon the theory of osmotic pressure pointed with quantitative uniformity to the fact that this is greater in aqueous solutions than the pressure calculated from the molecular weight of the substances as determined by other methods. It followed therefore that these substances when dissolved in water were in a different molecular state, that is to say, they must be more or less split up or dissociated.

Since just those substances which in aqueous solution are able to conduct the electric current, (i. e., the electrolytes) are under a considerably higher osmotic pressure than is to be expected from their molecular weight in the gaseous state and from their concentration, and since, these same substances lose the property of conducting electricity to any appreciable extent when dissolved in other solvents and at the same time cease to exhibit abnormal osmotic pressures, it follows that the splitting up of the substances in aqueous solutions is closely related to the conductivity of the electrolytes. This fact which was established principally by Kohlrausch, Hittorf, Ostwald, Planck, van't Hoff and many others, led to the development of the theory of ions and to the establishment of the laws of electrolysis by the Swedish scientist Svante Arrhenius. It would carry us too far if we were to enumerate and treat fully of all the numerous results achieved for general chemistry from these laws.

The question as to the nature of the forces which come into play in a chemical combination or reaction was asked long before a science of chemistry existed, and the question has not even yet been finally solved; nevertheless the manner of operation of these forces, their dependence upon such external conditions as mass, temperature, and pressure, has been investigated with undoubted success. The results of these investigations are the law of the effect of mass and the theory of chemical equilibrium. Chemical Statics. The scientific explanation furnished of the formation of ocean salt beds by van't Hoff and Meyerhoffer are one of its practical results. Out of all the results and successes which theoretical research has showered upon us, we will only mention the valuable discoveries which have been made in thermo-chemistry and electro-chemistry. Any change produced on passing an electric current through a compound body is called electrolysis, as far as electricity itself exerts its influence (Faraday, 1837). The practical application of this process is the separation of metals from their solutions (quantitative analysis by means of electrolysis was especially perfected by A. Claassen) or from their molten salts (calcium production (Borchers and Ruff)). Electrolytic reduction and electrosynthesis (Elbs and Tafel) are successful achievements in this field of research. The further perfection of electro-chemical science has completely cleared up the subject of the production of electric energy by chemical systems, and the thermodynamic theory of electro-chemical processes has advanced so for that we can calculate the electromotive force of numerous galvanic combinations (Nernst). Electrical methods are also often of value for characterizing chemical preparations (Abegg, Bredig and Drude).

Inorganic Chemistry. Great activity is again being displayed in the field of inorganic chemistry, which, since the epoch making discoveries of germanium of the hydrogen compounds

of the metals of the alkali and of rare earth groups by Clemens Winkler (discoveries which were of much importance in developing Mendelejeff's system) had been forced into the background by the signal advances of organic

chemistry. By using high and low temperatures, high and low pressures. liquid air (Linde), and the electric furnace (Borchers), it has become possible to attain quite new effects. We may here mention the operations which use liquid ammonia as a solvent (Stock) and the synthesis of certain natural iron ores by using pressure (Ruff).

As already pointed out, the latter part of the past Organic Chemistry. century stands almost entirely under the spell of the splendid developments of organic chemistry.

Hudrogen peroxide has been obtained in a crustalline form (Städel and Wolffenstein). The conditions of generation, the properties and the effect of ozone have been exactly investigated (Ladenburg, Nernst and Harries). The preparation of the colloidal metals and metallic oxides has been made a special study of by Pahl. Our knowledge of the properties of the rare metals and earths has been extended (crystalline Zirconium (Wedekind)). The chemistry of complex compounds has been considerably enriched (Rosenheim. Weinland and Grossmann, amongst others). The greatest success, however, has been attained by the study of contact-substances, such as finely divided platinum (platinum-sponge), the peculiar effect of which upon a mixture of gases was first discovered by Doebereiner and applied in his gas igniter. Clemens Winkler worked out the sulphuric acid contact-progress, which consists in combining sulfurous acid and oxygen to form sulphur trioxide by means of platinised asbestos, which resulted in a complete revolution in the manufacture of sulphuric acid (Knietsch). By a scientific treatment of this problem Engler and Lothar Wöhler have made it apparent that the property of platinum sponge of combining hydrogen and oxygen depends upon the absorption of oxygen (auto-oxydation) by the platinum sponge, whereby a peroxide of platinum is formed which ignites the hydrogen impinging upon it.

Analytical chemistry has experienced extension in many respects, and the analysis of gases has been brought to its highest point by means of the apparatus of Hempel, Cl. Winkler, O. Brunck, Bunte, J. Fischer, and Wohl.

The unprecedented successes of A. W. von Hofmann in the field of coal--tar dye-stuffs drew the general attention of chemists to purely synthetical work, and the original problems of Liebia, the investigation of the composition of natural and physiological substances, no longer held the field. With the ever increasing clearness given to the theory of the constitution of organic compounds and their laws of substitution, which reached a climax in the establishment of the formula of benzol by August Kekulé, synthetical work became more and more successful. One might have thought that synthetical chemistry had reached its highest point when Engler and Adolf von Baever produced indigo by artificial means, whilst Graebe and Liebermann did the same with alizarine, and Emil and Otto Fischer with rosaniline, and when the discovery of phenylhydrazine by Emil Fischer opened new paths of investigation in the chemistry of nitrogen, which led to the discoveries of free hydrazine and hydric nitride by Theodor Curtius,

and amidoguanidine by Johannes Thiele. But the victorious path of research did not stop here, but turned to attempt problems full of mystery, the treatment of which appeared far more difficult than any of those hitherto solved. The synthesis of sugar and the theoretical researches on the subject by Emil Fischer (and by Wohl, Ruff, Tollens, and Thierfelder) is the most brilliant confirmation of van't Hoff's stereo-chemical of unsymmetrical carbon atoms. The syntheses of uric acid, xanthine, theobromine, and caffeine by Emil Fischer, Robert Behrend and Wilhelm Traube, form the return to the problems of Liebia and their solution. The investigation and synthesis of the terpenes and camphors, the ethereal oils and artifical aromatic substances by Wallach, Tiemann, von Baeyer, Bredt, Beckmann and others, formed quite a new branch of organic chemistry, the hydro-aromatic branch. Yet another new field is opened by the heterocyclical combinations (Ladenburg, Knorr, Dennstaedt, Gabriel, Doebner, Busch, Stoer and others), which are closely related to the alkaloids. The explanation of the constitution, the decomposition and synthesis of these complicated alkaloids, of coniine (Hofmann and Ladenburg) of narcotine and hydrastine (Roser, Freund and Fritsch), of atropine and the cocaine alkaloids (Ladenburg, Liebermann, Merling and Willstätter), of nicotine (Pinner), of morphine and thebain (Vongerichten, Knorr, Pschorr and Freund), and of quinine (von Miller and Rhode) form pages of glory in the history of German Chemistry, and excite the greatest admiration for the discoverers.



Physiological chemistry and fermentation.

Great work has been done here, though there are still more difficult, if less inviting, problems yet to be worked out in the chemistry of the amorphous and colloidal natural products, of cellulose (Alexander

Mitscherlich, König, Wolffenstein) of caoutchouc and guttapercha, which possess such great value for technological purposes, and, more important than all, the chemistry of vegetable and animal albumen (Emil Fischer), of the colouring matters in the blood (William Küster) and of the digestive juices (Thierfelder, Kutscher, Siegfried, Salkowski, Fromm and Neuberg), all of which problems still have to be finally solved, for only when a knowledge of them has been obtained can a really scientific system of (Dedicine be built up. Physiological chemistry and organic chemistry are becoming ever more closely connected, especially since the introduction of pure cultivations of microbes, the chemical effects of which have been studied in many hundred different kinds of cases (Delbrück, Emmerling and Lindner).

In the chemistry of fermentation there were until recently two principal views held,—Liebig maintained that the process of fermentation was a chemical one, whereas Pasteur held that it was biological. The experiments made by Edward Buchner have now confirmed Liebig's view, for he has proved that pressed yeast-juice (the zymase) which contains no cell-substance (plasma) is capable of producing fermentation in exactly the same way as living yeast.

Dr. Harries.

C. Physics and kindred Sciences. ("Scientific Instrument" Group.)

10

During the eighties of the last century the opinion was often to be heard expressed, even in professional circles, that the science of physics might be compared to a structure which had been brought nearly to completion by masters such as Helmholtz and Lord Kelvin, and which offered science sufficient room for many years to come; it was thought that now it could only be a question of harmoniously fitting out the structure by working diligently at the details. To-day every one recognizes how erroneous that opinion was. As a matter of fact we can look back upon a development during the last ten years which will ever be remembered in the history of the exact sciences.

The movement was set on foot in Germany by Heinrich Hertz. Upon the early and much to be lamented death of this scientist, his teacher Helmholtz wrote: "In ancient classic times one would have said be had been sacrificed to the envy of the gods."

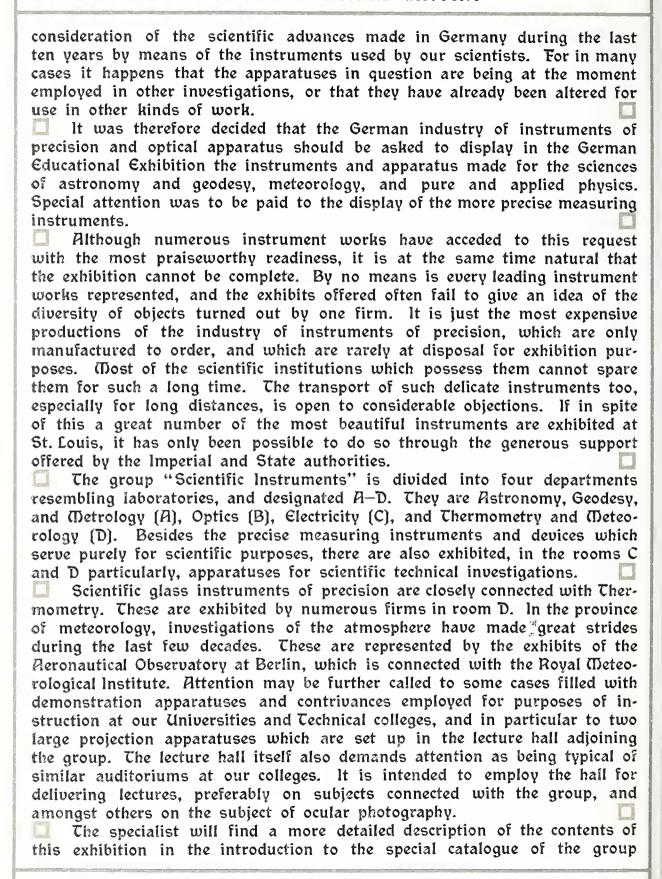
Unfortunately but a few months after the death of his great pupil the master himself followed; it was not granted him to live to experience the discovery of Röntgen, led up to by Lenard and others.

It is still in the memory of every one how much stir was caused by the discovery of the Röntgen rays in consequence of their immediate importance for medical diagnosis and research. A circumstance of far greater importance for the science of physics was, that within a remarkably short period it led to discoveries and work of the foremost importance by physicists of all civilized countries. We need here only mention the names of Becquerel, Curie, J. J. Thomson, Ramsay, Elster and Geitel. The importance of these scientists' discoveries will be better appreciated when we say that they have completely changed our previously held conceptions of the nature of matter. Another standard by which to gauge their importance is offered by the large amount of assistance and incentive they have given during the last ten years to kindred sciences such as meteorology and astronomy, chemistry and medicine.

This active mutual influence of the sciences, from which physics in turn have derived great benefit, may be designated as a characteristic feature of the evolution of the exact sciences during the last few decades. To keep to the simile already adopted, it has been found necessary to make very considerable additions to the structure of physics, and the same is true of the kindred sciences. These extensions have chiefly been the work of the physical institutes of our Universities and Colleges. The perfection of the older portions of the structure has, however, also made great advances, and an important share has fallen to the lot of those state institutions of Germany which are distinct from the universities.

Work in newly opened fields of research requires but simple aids, but as soon as it is a question of working out methods already known and of

extensive systematic investigations with the aim of ascertaining as accurately
as possible the relations in figures in a certain field which measurable
quantities bear to one another, the matter is different. Such work cannot
as a rule be undertaken by the laboratories and observatories of our colleges,
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either because the investigations cost too much, or because the all-important
duties of the professors as tutors do not leave them time enough to com-
mence making calculations which may last some years, and often require
the co-operation of several persons.
Since the foundation of the German Empire, a number of state scientific
institutions have been founded, chiefly in the kindred sciences of physics,
and already existing ones have been extended. Such are the Imperial Standard
gauging Commission at Charlottenburg and the Royal Prussian Scientific Ob-
servatories at Berlin and Potsdam (Astrophysical Observatory, Meteorological
and Magnetic Observatory, and the Geodetic Institute). In the field of physics
Germany was the first country to establish an Imperial Physical Technical In-
stitute. This it did at the end of the eighties at Charlottenburg. This Insti-
tution, at first under the guidance of Helmholtz and at present under that of
Kohlrausch, developed an unusually beneficial activity, and large state institu-
tions have been founded by England, America and France during recent years
after the pattern of the Imperial Institution. Other countries are content for
the present to establish state laboratories whose task is to work out pro-
blems in fields of special importance (electricity, for example), which in Ger-
many fall to the lot of the Imperial Institution.
After these preliminary observations we may pass on to the considerations
which have determined the system of organisation of the "Scientific Instru-
ment" Group.
It is not the first time that Germany has shown a collection of scientific
instruments at an international Exposition in the United States. At the Chi-
cago Exhibition of 1893 the instruments of a great number of branches of the
mathematical and natural sciences in the "German University Exhibition"
were displayed.
At that time special importance was attached to showing historically
interesting apparatus and original constructions of the instruments with
which German scientists had made important or memorable advances in the
exact sciences. It will suffice to recall the air pump of Otto von Guericke
in the field of physics, the instruments of Gauss and Weber, Kirchhoff's
spectral apparatus, and the instruments of Helmholtz. Quite apart from this
portion of the University Exhibition, the German Society for Mechanics and
Optics had collected together a considerable display of scientific instruments,
which bore conclusive testimony to the strides made by German instruments
of precision during the last decades of the past century.
In making preparations for the present Exhibition it was decided to
avoid a repetition of the display made at Chicago, and not to emphasize the
historical standpoint in the field of physics and the kindred sciences. It was
also decided not to make a systematic demonstration in the group now under
miss assisted her to make a systematic demonstration in the group now under



"Scientific instruments." It would have been difficult to sharply distinguish this from other groups of the comprehensive Educational Exhibition, and no attempt has been made to do so. In order to get a concise idea of the work done by Germany in the manufacture of scientific instruments, attention should also be paid to the exhibits in other German departments, particularly the "Chemistry" and "Medicine" sections of the Educational Exhibition. The careful observer of these exhibits will be confronted at every turn by the close connection and constant interaction between science and technology. We need only mention the incentive which is constantly being given to the technology of precision by the above mentioned scientific State Institutes as well as by the numerous Institutes in the Universities and Technical Colleges. On the other hand some of the firms exhibiting in the group bear testimony to the great assistance rendered to science itself, owing to such undertakings being carried on in a thoroughly scientific spirit. It is to be hoped that the exhibition of scientific instruments at the German Educational Exhibition at St. Louis of 1904 will have many points of novelty even for the observer who has carefully studied this branch of German industry at Paris in 1900, and that it will confirm the impression that German science and technology in this important branch are progressing satisfactorily. Dr. Lindeck.
D. Biology: Zoology and Botany. a. Zoological (Biological) Museums in Germany.
The principal aim of Biological (Duseums should be to awaken not only an appreciation of nature and of a natural and healthful manner of living, but also to bring home to every individual the fact that life follows certain fixed laws which can be determined with just as much certainty for the bird of the air as for the fish in the lake or river and for the medusa in the sea, and that man can only break these laws at the expense of his health and working capabilities. The large biological museums have other aims, which are however of secondary importance. These are to arouse a pleasure in nature and in the beauty and diversity of her products, to awaken an understanding for the structure of the various organisms and their adaptations, to increase the knowledge of mankind with regard to animate creatures, whether useful or harmful to his well-being, and, last but not least, to assist in the building up of the biological sciences. This is an extensive programme, and we readily admit that up to the present no German museum has proved fully equal to the task in every respect; but strenuous efforts to this end are being made in all directions, by this museum in one way, by that in another, for it is often the case that the means and assistance at hand necessitate a judicious limitation to particular fields of study.

Since the objects of nature are insufficient in themselves to demonstrate directly to the uninitiated the fundamental laws of physiology, and since long explanations are seldom read, many museums have drawn up quides in which a specialist has collected the available material into a connected essay, endeavouring at the same time make it more comprehensible by means of a system of questions and answers. For a number of years past the Berlin Central Establishment for the welfare of Working Men has taken up the organisation of such quides for workmen. The result in almost every case has been entirely satisfactory. These guides are the best means of gradually increasing the number of visitors to a museum. Some of the more recent museums (Bremen and Altona) have in addition a special lecture hall and a reading room, both open to the public; while in Altona popular lectures are delivered with lime-light views on objects in the museum. In connection with the Museum for Marine Science now being established at the University of Berlin, popular scientific lectures have been introduced for some three years past, the exhibits in the museum being much employed for the purposes of explanation. These lectures have been well attended. The subjects chosen are various branches of marine research, and often deal with the biology of marine organisms. Lectures with lime-light views are accompanied by the great disadvantage that those who attend them are unable to make any notes in the darkened room, and what they hear may thus be easily forgotten again. In Altona this difficulty has been overcome by the lecturers sending short extracts of their lectures beforehand to be printed in a local paper, the paper supplying in exchange a number of copies free of cost.

All the larger biological museums have issued catalogues which take into account the requirements of the average visitor, and are edited accordingly. They are also sometimes illustrated.

Next to the objects themselves, the labels attached to them are the most important part of a museum, for they have as a rule to take the place of a spoken explanation. Many museums adopt the good plan of printing short general explanations which can be quickly read, and more detailed explanations of the objects of particular interest. The museum of natural science at Berlin, as well as other museums, uses in many instances geographical labels upon which the district where the exhibit is found is marked in red on a small chart of the world, as well as any localities where it appears in various geological strata.

Biological museums in Germany are principally of a zoological character, since the preservation of plants in a manner true to nature is accompanied by considerable difficulties. As a substitute we find in many of the larger towns botanical gardens containing extensive collections of living plants. In all the larger museums, too, there are botanical departments with comprehensive collections of plants for the use of specialists, whilst some of the dried plants, such as the specimens of woods and seeds, are also open to the inspection of the public.

Biological museums may be divided up into three groups, according to size and the class of people who visit them. 1. General museums or People's Museums, which aim at cultivating all branches of Biology, and often give special attention to special branches such as commercial geography, knowledge of mercantile wares, raw products and the various forms in which they are industrially employed. This class of museum is naturally only found in the larger towns, for they cost considerable sums to establish and keep up. The largest museum of the kind in Germany is the Natural History Museum in Berlin. The second place is held by the Hamburg Natural History (Duseum. Other important museums of this class are those of Bremen, Frankfort-on-the-Main, Stuttgart, Dresden and Carlsruhe. 2. Provincial museums. These are of the same character as the general museums, but their programme is somewhat more restricted. Their chief aim is to give full consideration to the interests of their particular districts. Thus the West Prussian Provincial Museum at Danzig makes a point of carefully collecting animal and vegetable fossil remains that are found in amber, as well as the prehistoric urns and utensils which are found in such numbers in that province. The Altona Provincial Museum, which exhibits the animal and vegetable world of the district in splendid biological groups, is an excellent representative of this type. The artistic treasures of the country are also very cleverly displayed there on the same principle; we see the Holstein peasants sitting around the wide wooden table in their becoming costumes, and in the hall, the walls of which are decorated with Dutch tiles, we see the housewife busy with her duties about the old-fashioned hearth. 3. Museums of the Biological Institutions at Colleges, Universities, Agricultural Schools and Academies of Forestry. The principal purpose of this class of museum is instruction, and it is this which gives them their special form. The University museums for example show a preference for anatomical and embryological slides and models rather than for a systematic collection. The most important of these museums, such as those at Munich, Breslau, Bonn and Tübingen, make a practice of admitting the public on certain days of the week. In the course of the following remarks only the zoological collections are referred to. The botanical collections, for the reasons mentioned above. are of considerably less extent and importance. The tendency is becoming more and more marked to divide the objects collected into two classes, a show collection likely to interest the general public, and a scientific collection to which only scientists and students are admitted. At the Natural History Museums in Berlin and Hamburg this principle has been fully carried out, whilst other museums have only followed it partially, some more, some less. The advantages of adopting the system is clear. For the exhibition the best objects are carefully selected,—non multa, sed multum. Visitors should not be obliged to wander through endless rows of stuffed birds, cases of insects or jars of spirits, but should only be shown the

most important objects; these, however, must be faultlessly arranged and explained, so that they are attractive to the eye and at the same time instructive to the mind. All objects which are not suitable for this part of the museum are collected and set aside for examination in the scientific collection. Three important factors must be considered in order to render the collections of all larger museums attractive to the general public: the rooms must be as well lighted as possible, the objects must be presented to view in faultless cases, and sufficient opportunity must be given to visitors to rest a while upon comfortable benches. This last point is unfortunately neglected in most museums, in spite of its being a well known fact that visiting a large collection is very tiring and occasions as much mental strain as physical. If one returns home exhausted after visiting a museum, one has no inclination to repeat the visit.

in connection with museums. It has but too often happened that the architect from artistic considerations has made the windows too small, and this considerably reduces the value of the whole building. The Altona and Bremen museums testify to the fact that even in buildings of considerable size the lighting may be satisfactory throughout, provided the buildings stand quite alone. If the windows are made high and broad, and if no cases are arranged against the exterior wall, then as a rule all the objects exhibited will receive sufficient light. In the new building at present in course of construction for the Darmstadt Natural History (Duseum, Prof. G. von Koch has hit upon novel and excellent method of lighting for the large animal geographical group which occupies a surface area of 20 square metres or more. The arrangement is similar to that of an aquarium where the visitor finds himself in semi-darkness while the greatest amount of light falls obliquely from above upon the vessels of water and other objects. It cannot be denied that every object obtains a sufficient amount of light by this means, whilst the visitor himself is surrounded by a pleasant semi-darkness.

In the matter of exhibit cases, the Dresden museum undoubtedly holds the foremost place in Germany. The more recent museums one and all favour the substitution of iron cases for wooden ones, although they are more expensive; the advantages are, however, so great that the cost ought not to be considered. They can be made almost absolutely dust-tight, of infinite durability, and the parts necessary for fixing glass panes can be reduced in size to a minimum, so that they permit of the greatest possible clearness and the best utilization of space. The larger the panes of glass in front of the case, the more attractive to the eye the latter becomes. In Dresden there are some very high and broad sample cases which are set on rollers and can consequently be easily shifted. Their huge doors can be opened and shut with the greatest ease.

In the best modern constructions all locks and hinges are arranged inside, so that nothing can be seen but smooth narrow strips of iron. Within the cases the objects are placed upon glass plates which can be ad-

justed to any desired height. In most museums the cases are painted dark on the outside, black, with a suggestion of blue or green. Opinions held by German specialists as to what the inside colour should be, vary very considerably. In the large Berlin museum Geh. Reg.-Rat Möbius chose a light vellow shade for all the cases, as well as for the mounts and supports of all the objects exhibited, and for the labels and notices. There is no doubt that this sand or khaki colour has its advantages for many objects. Brown or any dark coloured birds or mammals stand out splendidly against this background. For corals and skeletons a dark blackground is most suitable. If a case containing jars of objects preserved in spirits stands in a corner where it gets little light, the objects should be made to stand out more clearly by using a dazzling white paint. In Dresden light green and light blue shades have also been used with success. The old rule holds good in this that one ought not to adhere to one principle, but that the colour should be selected according to the character of the exhibit. With regard to arrangement, the larger museums follow a systematic principle throughout, so that the anatomical and embryological exhibits and models are found near the systematic material connected therewith. There are of course exceptions; the skeletons of mammals for instance are often enough placed by themselves on account of their number. In the collections of the zoological institutes at the Universities and other educational establishments. the same arrangement predominates. In some cases, as at Heidelberg or Tübingen, the anatomical exhibits are arranged by themselves organically. The Hamburg museum has made an important advance in the systematic preservation of animals in spirits, by painting the objects with water colours, this giving a very natural appearance to fishes, crabs and other creatures.*)

Almost all the more important museums of Germany take considerable pains to-day in presenting "biological groups" or "pictures of life," in which several animals and plants are shown in their natural surroundings. The museums recently opened at Bremen, Altona and Darmstadt are characterised first and foremost by their large number of excellently represented biological groups. The animal kingdoms of the Alps, of the Arctic regions, the desert, or of the native woods, oceans and coasts, form material for groups which are frequently as charming as they are animate. The difficulty of describing single objects can be overcome either by attaching small numbers to them so as not to interfere with the appearance of the group, or still better by coloured photographs with numbers and corresponding descriptions. Many old museums have followed the example thus set, and have endeavoured to bring new life into their galleries by similar pictures from nature. At Darmstadt the experiment has been made to put groups together from an animal-geographical point of view: the animal life of Australia and new Zealand, as well as that of South America, have been combined into one large life-like group, and although they are somewhat unnatural, the

*) See (D. von Brunn's "Ein Beitrag zur Museumstechnik," issued by the Nat. Ver., Hamburg, XIII, 1895.

different species living in primeval forests, steppes and highlands being all too close together, they still produce a highly instructive and fascinating effect. A certain amount of unnaturalness can never be avoided in a museum. In the Maritime Museum in Berlin the biological principle has been very fully extended to the animal and vegetable kingdoms of the sea. A large, dry coral reef about 20 sq.-ms area, and 22 large "Alcoholariae" present a plastic idea of the plenteousness and beauty of colour of the inhabitants of the sea.*)

The above aphoristic explanations will suffice to show that the biological

The above aphoristic explanations will suffice to show that the biological museums of Germany are energetically advancing, constantly endeavouring to stimulate their visitors to a natural scientific mode of thought, and to awaken in them an enjoyment of nature. In the same degree in which increasing industry is sapping public health, the biological and hygienic sense of appreciation of our lower classes must be developed. Our natural-science museums are called upon to act as a wholesome counterweight to the evils which the concentration of enormous masses of people in large towns and the constantly increasing number of factories bring in their train.

L. Plate.

b. Botanical Gardens and Museums.

Owing to the new lines of investigation in the science of botany, and in accordance with the ever increasing efforts to make the results of scientific research accessible to still wider circles, the scope of botanical gardens and institutes has so widened that they are no longer able to carry out their aims in all the Universities and High Schools in the same manner, and in several of the latter have been obliged to confine their activity within certain limits. Seeing that besides systematic botany, anatomy and physiology, both the geography and pathology of plants are constantly advancing to the fore in botanical studies, the requirements of botanical institutes are in no small degree increased. Formerly botanical gardens were places containing collections for the botanical study of plants necessary for the scientific experiments of professors and students, biological studies of indigenous plants were made by preference by means of regular botanical excursions, while with regard to exotics one was contented with one or two specimens in conservatories, with drawings, preparations, and a collection of their fruits.

For all botanical institutes, with small means, and in which besides the professor not even a systematically educated custodian is employed, such a limitation is indeed expedient. At the present day it may be regarded as indispensable that in every botanical garden the medicinal, poisonous and useful plants should be placed in a particular department, or distinguished by special labels; and nowadays a professor would rarely like to do without a biological department in which the development of vegetable organisms in

*) See L. Plate, "Beiträge zur Technik des Sammelns, der Konservierung und der Aufstellung biologischer Gruppen mariner Tiere." In Verh. "Deutsch. Zoolog. Ges." 1903, p. 143-158.

relation to the varied conditions of plant life is prominently set forth. A botanical museum will also soon be a necessity as a means of instruction in every University. In greater cities however, the fact must be taken into consideration that teachers and scholars of various academies, indeed often business men and others desirous of knowledge, visit botanical gardens and museums to obtain instruction, and it is not only individuals who thus seek knowledge, but often whole societies conducted by a professor or learned botanist, whilst latterly Workmen's Unions are taken to hear lectures in botanical gardens. Experience has taught that, in spite of the unavoidable misapprehensions of many, just this class of people derive profitable inspiration and satisfaction from their visits. In this way botanical gardens and museums are acquiring a greater significance in furthering the education of the people, and the universal and increasing demands for this means of instruction must be considered when laying out such gardens in large towns, whilst making provision that their earnest aim as a means of education should not be thwarted by their being used as a public promenade for loafers Botanical gardens have the same aim as museums, and and children. similar rules should be made for admission: they are not intended to replace public parks and pleasure grounds, which enlightened Town Councils, influenced by professors and persons versed in botany, are now trying to make instructive.

The Royal Botanical Garden in Berlin and the Botanical Museum connected with it have in accordance with the increasing requirements undergone many changes, which have, however, for the present attained their completion in the new garden and museum at Dahlem. These institutions not only promote botanical science in systematic and biological directions, including botanical geography and phyto-palæontology, but also in pharmaceutical, technical and commercial botany, and for the last ten years colonial botany, the rearing of useful tropical plants and the study of those injurious to them. Since the year 1801, in which the celebrated botanist Willdenow became Director of the Botanical Garden in Berlin, its treasures increased immensely, so that in the year 1812 the number of cultivated species had risen to 7,700. Under the direction of Link (1815-1851), A. Braun (1851-1877). Eichler [1878-1887], and the present director Engler (appointed in 1889) this number has steadily grown, and an enlargement of the old garden (in 1857) as well as the erection of several new conservatories in the same became necessary, of which we need only mention the new palm-house erected under Braun 1857-1858, and the hot water conservatory or Victoria house built under Eichler, as they are still in use, and on account of the over-stocking of hothouse plants in the new garden will probably remain in use for a year or two.

Under A. W. Eichler's direction several innovations were introduced, aiming at greater facilities for the instruction of the masses. A department was reserved for pharmaceutical and useful plants, and a small Alpine garden and a section for aquatic plants were made; further, the hot-house plants

were planted out during the summer in geographical groups. The Botanical
Museum arranged under his direction was found to be too small ten years
after it was opened.
Dore important changes aiming at the improvement of botanical in-
struction in the University were introduced by Engler first in the old
Botanical Garden, and on the laying-out of the new one were transferred
to this and extended. Besides the already existing department for cultivating
useful plants of the temperate zone, another was formed for tropical and sub-
-tropical useful plants. The Systematic Department was so altered that not
only, as is usually the case, were the shrubs systematically grouped, but a
prominent place was given to the most important types of a whole family,
as far as the conditions of the open country would allow in summer, while
annuals and bi-ennials were placed beside the shrubs in pots. Such an
arrangement possesses the great advantage of affording the teacher the op-
portunity of presenting his pupils with a general view of the most striking
forms in any one group of plants.
Then a Morphological-biological Department has been fitted up,
intended to show how plants exist under different conditions, and how they
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modify their organs to suit their surroundings.
A second similar division exhibits the variation of plants in growth,
leaf colouring and development of blossom, and a third shows the very
varied sexual relations of plants.
The Geographical Grounds, covering an area of about 100 as, which
presents to the visitor the plant world of the temperate zone, has undergone
an important reform; viz., in contrast to the arrangement of all the former
botanic-geographical groups, a great value was attached to the imitation of natural formations.
Corresponding groups were also arranged in the botanical museum,
but above all a laboratory was fitted up there for practical and independently
working students (Doktoranden). This led to the treasures of the Botanical
Garden and Museum being much more used for study, particularly for
anatomical work. But another problem was set the Botanical Gardens and
Museum when Germany came into the possession of foreign colonies.
Then our Botanical Institutes saw the task set before them, not only of
coping with the ever increasing introduction of new objects of interest, but
of taking their part in furthering the culture of useful plants, in the utilisation
of the products of countries under German protection, and the examination
of them as to their practical use. Thus as early as in the year 1889, useful
tropical plants were sent to the Cameroons, and in 1891 a Central Botanical
Station for the Colonies was connected with the Garden and Museum,
which undertook the propagation of useful plants in order to introduce them
into our colonial territory, as well as the training of gardeners and managers
of plantations. After some of the officials and also the Director had been
in the tropics, one was better able to judge of the conditions prevailing
there, and especially to pay attention to the noxious plants among the culti-

vated ones, as the cryptogamic division of the Botanical Museum is very rich in funci which occur in the tropics as noxious plants. The rise of completely new suburbs in the neighbourhood of the old Botanical Garden, the injuring of many plants, particularly conifers, by smoke, the faulty construction of the older conservatories, and the impossibility of enlarging the garden on its old site, induced the Government after some hesitation to decide on its removal. Thanks to the energetic efforts of the Ministerial director Dr. Althoff, an especially appropriate site of 42 hs has been granted in the Royal Domain of Dahlem. In this area, as the exhibited plans show, it is now possible to meet all botanical requirements: this land also has the great advantage that it is treeless, so that each department can be arranged according to its particular aim. A sufficiently large space is also provided for the Botanical Museum, as well as for its future enlargement. The Museum Building consists of three parts: one for instruction, with laboratory and experimental rooms, one containing the now largely extended Library and Herbarium, and a third part accessible to the public as an Exhibition. The material which serves for scientific investigation is in a separate part. There are work-rooms besides for the officials and other botanists. The exhibition or open department of the museum is divided into systematical, pathological, pharmacognostical, technical, economic, colonial, geographical and phytopalaeontological sections. The Morphological-biological Section (1 ha) adjoins the Museum. The two divisions for medicinal and poisonous plants (20 a in extent) as well as for economical plants of the Temperate Zone (44 a) are close by. That for systematic botany (4 hs) again, lies at a little distance from the Museum. In the north west of the Gardens the large group of Exhibition Conservatories is to be found as well as the Palm-House, and adjoining these the propagating houses, these latter not open to the public, including a morphological-biological as well as a Colonial Section (6 a) and farm buildings. In the centre of the Gardens an area of 11 hs is laid out geographically, thus giving a concise view of the vegetation of the North Temperate Zone, bringing into prominence the most important formations of the various countries and mountainous regions. In these grounds some of the groups are turned in summer into sub-tropical floral beds by the arrangement of plants in pots. It cannot be denied that this department of the Botanical Garden costs much trouble and money; but the plantations, especially those of the high mountainous regions, flourish excellently, in such a manner as has astonished many an inhabitant of the Alps. These grounds greatly facilitate the instruction in plant geography, because the lecturer can easily supplement his verbal instruction by pointing out certain traits in the individual floral domains, whilst the geographical collection in the Museum serves to complete the illustration. In the large conservatories, pictures of vegetation in the tropics are

hung, while in another division the useful tropical plants minutely labelled, may be studied. Thus opportunity is afforded to thousands of people of

comparing the plant-world of this and foreign countries, and so extending their knowledge. It must be admitted that the vegetation in distant lands far surpasses these representations, yet this kind of picturesque grouping interests not only the ordinary sightseer but also the botanist to a higher degree than the systematic divisions. Finally the large Arboretum, 15 hs in extent, must be mentioned, as it contains the trees which thrive here, systematically arranged.

It is important to mention that in the neighbourhood of the new Botanical Garden there are institutions whose aims are akin to botany, such as the Royal Horticultural Academy, to whose students the lectures and demonstrations in the Botanical Gardens are open, the Imperial Biological In-

tanical Garden there are institutions whose aims are akin to botany, such as the Royal Horticultural Academy, to whose students the lectures and demonstrations in the Botanical Gardens are open, the Imperial Biological Institute in which the diseases of indigenous plants are investigated and agricultural experiments made, the Pharmaceutical-chemical Institute which goes hand in hand with the Pharmaceutical-botanical Department in the Botanical Museum, the Colonial-chemical section of which co-operates with the central botanical station in the Botanical Garden and Museum.

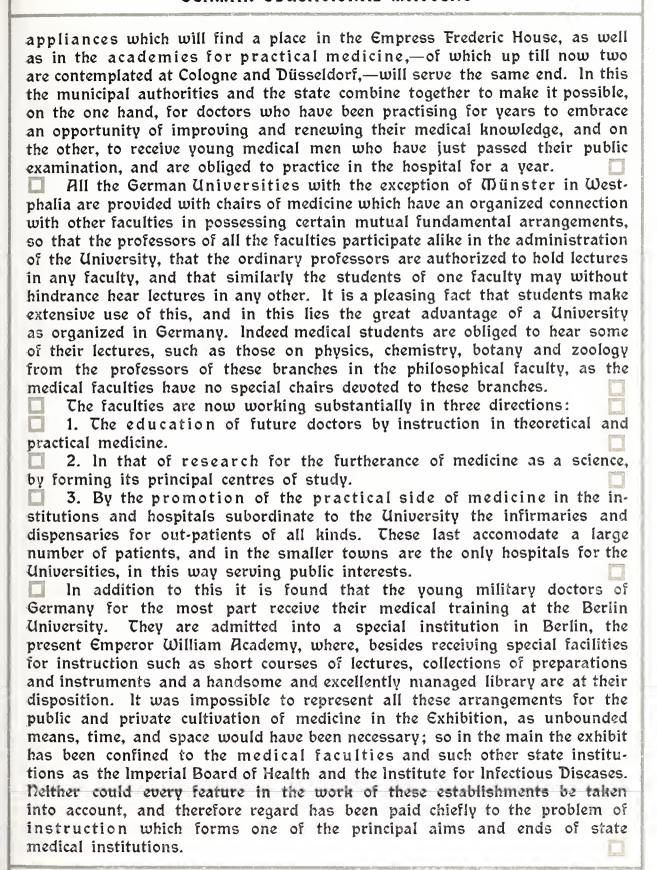
In this way the great number of plants which arrive at this centre of the Empire from our colonies and other lands, are made accessible to wide circles, and form a source of intellectual stimulus and in many cases of practical activity. Through the circumstance however of the departments which serve practical purposes being joined to the purely scientific ones, the former are prevented on the one hand from committing grave errors, whilst on the other hand incitement is given to learned botanists to consider the necessities of practical and universal instruction while prosecuting their purely scientific studies. The Botanical Garden and Quseum serve also to encourage botanical efforts not only in the kingdom of Prussia, but in the whole German Empire, the Colonies and other lands, by lending collections of dried plants and sending seeds. Thus the Garden and Quseum, and the same may be said of all similar establishments in German States, are not only parts of a University, but are National Institutions.

There are museums, in which rich collections brought together by generous learned men and intrepid explorers lie unused or are not turned to the advantage they ought to be. In Berlin even, it was impossible for a long time through the lack of sufficient scientific assistance to work up the botanical material which had been brought thither during the last century by numerous explorers. This state of things has been improved there as elsewhere by the appointment of a larger number of scientific officials, and now the scientific arrangement of large dried plant collections is making satisfactory progress. The necessity for Germans working in our Colonies to become acquainted with the plants around them, and especially to discover useful plants, leads botanists at home to thoroughly investigate exotic plants; yet care must be taken that in the satisfying of present wants science does not suffer.

Many systematic essays and treatises on plant geography have been published by the officials of the Museum and recognised even outside Germany

as valuable additions to science. The connection which exists with the Royal Prussian Academy of Arts through the publication of the comprehensive work "Das Pflanzenreich" (The Vegetable kingdom), or "Regni vegetabilis conspectus," is especially conducive to the interests of science. It is self-evident that only a very small part of the comprehensive tasks of both Institutions which are here hinted at can be presented at the Exposition. First of all a survey is given of the most important scientific work carried on during the last ten years, so as to show what a substantial share the Berlin Garden and Museum has had in the progress of botanical investigation. These studies are partly large general systematic works and partly special monographs and elaborations of plant geography from various regions. Further it is by shown by some sketches and photographs how the newly founded Botanical Garden at Dahlem seeks to fulfil its tasks, especially regarding the representation of biological conditions as well as the domain of plant geography. Finally, by a selection of important and remarkable vegetable objects from the colonies, a picture is given of their progress in botanical research, in which less stress is laid on the exhibition of large quantities of the more common vegetable products, but more on the scientific character of the collection. Dr. Engler.
6. Medicine. 11.
The study of Medicine in Germany, whether in its scientific and practical aspect or in its progress, is partly public partly private. In the German Educational Exhibit at St. Louis, the government organisation is particularly brought into view, and will therefore be specially dealt with here: the private institutes, however, which take a very noticeable place in Germany, are briefly referred to, especially as their work is also a result of the scientific medical education at our universities, and is not entirely unrepresented at the Exhibition. To the private establishments belong the medical societies, the hospitals supported by private contributions, institutions founded for the study of medicine, and the various medical journals and archives, &c. Some of these publications are published and paid for by the State. The activity of the medical (Doctors') societies is great, for it can be said that such a society exists in every town of 30,000 inhabitants, holding regular sittings at which mostly original papers are read. Many of these societies have a large number of members, the Berlin Medical Society having alone 1,000; Rudolf Virchow was chairman of the latter for many years before his death, and his successor is Ernst von Bergmann. We may mention here also the Berlin Society for Internal Medicine, with von Leyden and Kraus as Presidents, and also the German Surgical Society, the great medical Societies of Munich, Dresden, Hamburg, Leipsic and Stuttgart. Though perhaps private activity is not so prominent here as in America

vet throughout Germany there are imposing and well fitted up hospitals supported wholly or partially by private means, to say nothing of those large hospitals whose cost is defrayed by the community. To this class belong the hospitals of the Roman Catholic religious orders, particularly those of the Brothers of Mercy, those of the various Roman Catholic sisterhoods, the excellent St. Hedwigs Hospital in Berlin, and the no less excellent Evangelical Deaconess Hospitals, of which the "Bethany" Hospital in Berlin is a good example. Numerous small and large private endowments make it possible for the poorer class of medical students to carry on their studies, for the more talented to complete them by providing books and apparatus and paying travelling expenses, and also enable pupil teachers and assistants to study scientific or practical medical problems. Particular mention should be made here of the legacy of the Countess Louisa Bose, who bequeathed to the three Universities of Marburg, Jena and Berlin a sum amounting to more than two million marks for such purposes. Without disparaging the periodical literature of other countries we may well say that the scientific medical journals of Germany take a first place: we need only refer to the "Archives of Anatomy and Physiology" which can look back on a hundred years of existence, and also to Virchow's Archives for pathological Anatomy. The State arrangements for the study of medicine are: 1. Medical Faculties at the Universities: 2. Special Institutions serving for the cultivation of Public Medicine and Hygiene; 3. Institutes for continuing medical education, particularly that of the ordinary practitioner, after leaving the University. Let us first turn our attention to the Institutes mentioned under headings 2 and 3: to these belong among other institutions the two large ones in Berlin, the Imperial Board of Health and the great Prussian Institute for Infections Diseases, with which the Prussian Institute for Experimental Therapy in Frankfort-on-the-Main is connected. In addition to these there are the State Vaccination Stations. Other public hygienic establishments are joined to the Universities, such as the large one at Marburg for hygiene and experimental therapy under the direction of Prof. von Behring. Others again, in which state provision is supplemented by private contributions, exist in the form of sanatoriums for tuberculosis. The establishments comprised under head 3 are of the most modern date. In Berlin, the Empress Frederic House for the improvement of medical education by the aid of state and private means, is an institution which is destined to serve as a center and foundation of the whole higher education of Germany. The organisation of such higher education is the task of the Central Committee for Postgraduate Instruction which has already founded local associations in twenty-five of the large towns of Germany for providing gratuituous continuous courses of instruction and lectures for medical practitioners. The state collections of educational medical



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The German medical exhibit at St. Louis is intended to demonstrate the important objects of instruction in the several departments of medical science which have either come into use in Germany since the Exhibition at Chicago or were not represented there. At the same time the exhibit is intended to symbolize, as far as possible, the manner in which instruction is given in the separate divisions, and must accordingly comprise not only the methods of Instruction but also the educational appliances used. The various objects are distributed in the exhibition in the following manner: round a space fitted up as a lecture hall for lectures and demonstrations particularly for projections by the sciopticon, five divisions have been grouped which are specially intended to illustrate the methods of instruction. The largest division is taken up by bacteriology; immediately adjoining is that of anatomy, then surgery in two subdivisions, followed by that for pathological anatomy, and finally by that for medicine proper. In an ante-room leading from the lecture hall to the corridor and opposite it educational appliances are placed, Roentgen ray apparatuses being specially prominent, whilst the remaining exhibits, which have not been placed in the other divisions, have been arranged in a small narrow space separated by a passage from the Roentgen cabinet and the lecture hall. Germany attaches the greatest importance to this exhibit of the methods of instruction, because it has been her constant endeavour to cultivate the same with every means at her disposal. It cannot, however, be expected that the objects and preparations exhibited to elucidate her aim (methodics) should be showy. They rather illustrate by a few examples the course of instruction in an appropriate and simple manner. Thus in the Bacteriological Cabinet, the objects for which have been chiefly selected by Prof. A. Wassermann of Berlin in co-operation with the Imperial Board of Health, the methods are symbolised which are used in the identification of the va
Thus in the Bacteriological Cabinet, the objects for which have been
Imperial Board of Health, the methods are symbolised which are used
in the identification of the various bacteria, modes of cultivation, dyeing, &c. Further a series of drawings, illustrations, preparations for projections which
are made use of in research, are exhibited. The changes also which bacteria produce in human or animal organism are shown as far as they serve for
methodical research and educational demonstration.
Endeavours have been made in the anatomical section to exhibit a series of preparations showing how practical instruction is imparted to-day
in the Berlin anatomical lecture halls. In connection with this the anatomical cabinet contains quite a series of educational appliances used at
the lectures.
In the surgery section two subdivisions have been made, one under the direction of Prof. von Bergmann of Berlin, the other fitted up by Prof.
von Mikulicz-Radecki of Breslau. The method of instruction is demon-
strated in these divisions by a series of models representing the single stages

In the cabinet for pathological anatomy, arranged by Prof. Orth in Berlin, great attention has paid to methods of preservation of preparations in which the natural colours are retained; among these methods those of Melnikow, Jores, Kaiserling, and Pick are prominent. The section for Internal Medicine has been prepared by Professors von Leyden and Kraus of Berlin, and comprises those means of investigation and appliances which concern the ætiology, the diagnosis and the therapeutics of different conditions of illnesses, and which are used practically. The Roentgen Cabinet contains apparatuses exhibited by Messrs. Siemens & Halske, besides various Roentgen photographs by various investigators. As often as opportunities occur, lectures and demonstrations will be given in the Lecture Hall. Dr. Waldeyer.
3. Upper and Lower Schools.
When German methods of education and training were demonstrated for the first time in America at the World's Columbian Exhibition at Chicago in 1893, there was more space at the disposal of the German School and its teaching apparatus than this time at St. Louis. But many things can now be dispensed with which were amply brought before the notice of the visitors to the American World's Fair of ten years ago; and matters concerning German schools and education which have been reformed, or which have come into existence during the last decade, can now be specially dealt with. However much German teaching methods may be appreciated in other countries, this circumstance does not prevent erroneous ideas of the characteristics of some of our schools from prevailing abroad, even in educational circles. It has therefore seemed desirable, in spite of the limited space at disposal, to illustrate the various upper, middle and lower schools by typical examples. The old Gymnasium, with its traditions extending over centuries, was until a few decades ago the only preparatory school for the universities. It is characterised now as then, by its extreme adherence to the study of the dead languages; the following schools are arranged according to that plan, whether their course begins in Sexta (sixth class) or in a higher class: the South German Lycées, the Grammar schools (Halle and Magdeburg), the Royal National schools (Meissen, Grimma, Pforta), the monastic schools (Ilfeld, Rossleben), the Wurtemberg lower evangelical-theologico-philosophical seminaries, and the military academies for young noblemen (Brandenburg, Bedburg, Liegnitz). In many of these older establishments, the pupils, at least a number of them, have also board and lodging (collegers, boarders, foundationers). In order to permit the foreign educationist to form an impartial opinion, not only have the external and internal arrangements of a large and favourably situated establishment of this sort been represented, but also those of a more

Posen, and the Royal Gymnasium in Wongrowitz). The Joachimsthal Gym-
nasium, founded by Joachim Frederic, Elector of Brandenburg, has
been selected to illustrate an endowed school, whilst Schulpforta, founded
by Duke Moritz of Saxony, also an endowment, is an example of the
old Royal and National schools.
Under the name of Pro-gymnasiums, frequently called Latin schools in
South Germany, we understand schools without upper classes chiefly devoted
to the study of Latin and Greek.
Since German educational methods were last exhibited in America, reform
schools have made great strides in Germany. In the United States this term
conveys a totally different meaning. In Germany it represents schools of a
classic or a modern tendency which first instruct all their pupils alike through
several classes, and then, on this common foundation, continue the instruction
either in the classical method of the gymnasium or in giving greater attention
to the modern languages, mathematics and the natural sciences.
Since Director Schlee of Altona created this common basis for the Real-
gymnasium (a high-school of nine classes, with Latin, French and English,
but no Greek) and the Realschule (a high-school of six classes, without the
three upper ones, and which cultivates modern languages only) and there has
been a great deal written for and against this principle. Extended practical
trials of it were not made until 1890; in 1898 this reform plan was in
working at 30 German high-schools, whereby two systems were distinguished,
that of Altona and that of Frankfort.
In both these systems the teaching of French began in Sexta (elementary
class, pupils averaging ten years old); but the first added English in the third
and Latin in the fourth school-year, while the Frankfort system, chiefly ad-
vocated by Privy Councillor Reinhardt, Director of the Goethe-Gymnasium
at Frankfort-on-the-Main, allows of only one foreign language (French) in the
three years' course of common instruction, followed in the fourth year by
thorough instruction in Latin, and not until the sixth school-year (when the
pupils are about fifteen or sixteen) is English added on the modern side
(Reformrealgymnasium) and Greek on the classical side (Reformgymnasium).
In our school exhibition at St. Louis, the Goethe-Gymnasium, the Model School at Frankfort-on-the-Main, and the Reformrealgymnasium at Barmen
represent the German reform schools, while in the catalogue and in written
notices and time-tables there is abundant material to allow the foreign educ-
ationalist to form a clear idea of the important changes which have taken place
in the matter of German, and more especially of Prussian high-school methods.
The older (Normal) system of the Realgymnasium is illustrated
by the Elberfeld institution, while the third group of high-schools—those of
nine classes, without Latin or Greek, in place of which a very thorough study
of modern languages, mathematics and the natural sciences is made—is re-
presented by the Oberrealschule of Bochum.
After a six years attendance at one of the high-schools with satisfactory
results, the pupil receives a certificate entitling him to serve for one year in the

army instead of two. The Realschule with six classes which teaches French and English but no dead languages, dismisses its pupils with this certificate, and its system and work are shown in this exhibition by the Realschule of Kreuznach. As the founder of the Berlin Realschulen (Modern schools) desired to give an opportunity to clever boys leaving the upper classes of the elementary schools (mostly at 12 years of age) to enter a high-school without difficulty and take advantage of its educational privileges, the authorities have created a number (now 13) of Realschulen, in the curriculum of which no foreign language is taught in the first two classes. This is contrary to the general government plan of study for all Realschulen outside Berlin, and is meant to facilitate the transfer of pupils from the elementary into the higher schools. In the four upper classes French is taught very thoroughly, while English has on the whole not sufficient time devoted to it. school is represented in the Exhibition by the Second Berlin Realschule. Finally, to give an idea of the numerous private schools and their methods, the Evangelical Boys' Grammar-School at Godesberg has been selected, which is specially interesting on account of its pleasant situation on the Rhine, and from its peculiar organisation. It comprises a colony of comfortable family homes in which those boys who are far from their own homes are received as members of Christian families. There is no opportunity for the mixed education of boys and girls in schools of this type. In Germany girls receive their education—except in the Grand Duchy of Baden—partly in the national or board-schools for girls (see exhibition of the 213th Gemeindeschule in Berlin), and partly in the highergrade schools for girls with nine or ten classes. In these schools great attention is paid to the study of modern languages, and the instruction of the pupils is carried to a point which enables them to enter the teachers' seminaries so often connected with these establishments, they also having the opportunity of practical teaching as pupil-teachers in one of the "Practice schools" (Übungsschule) connected with the seminaries. A typical example of this class of schools is found in the Royal Augustaschule at Berlin. The seminary of this school grants a certificate qualifying for the post of teacher at the higher and intermediate grade girls' schools, and also offers the pupils the chance of taking courses in the dead languages. At the time of the Chicago World's Fair we had no "gymnasium" schools for girls at ail. The first girls' gymnasium giving a certificate qualifying for studying at the University was founded in Carlsruhe in 1893; almost at the same time Helene Lange opened a Gymnasium course for girls in Berlin, and this was followed by Fräulein Dr. Windscheid's Gymnasium course at Leipsic. The exhibits of the Sophienschule at Hanover, an upper municipal school with a gymnasium course for girls, illustrate the work and tendency of the latter schools. National-school teachers obtain their preliminary training in independent seminaries; the one selected as typical for the purpose of our ex-

hibition is the Royal Teachers' Seminary at Burgsteinfurt in Westphalia. 📋

GERMAN EDUCATIONAL MATTERS The corresponding institutions for male teachers are the Schoolteachers' seminaries, represented by the one at Ziegenhals, the preparatory course for which is passed at the so-called "Praparandenanstalten" or preparing establishments. In addition to this there are also Practice Schools (Übungsschulen) of one and three classes, which provide the necessary pupils for practical experimental teaching. We have no special Teachers' Colleges or Normal Training Schools for training candidates who have already gone through a special course at the Universities for higher teaching posts, as in the case in America. The principal part of the training is relegated to the Universities and their seminaries. In order, however, to meet the requirements of the examination for higher grade teachers, in a number of the higher educational establishments seminary courses have been introduced which are immediately connected with the teachers at such establishments, and are intended to give beginners in the teaching profession opportunity to obtain further pedagogic training. This is done by means of conferences held under the presidency of the Director, by allowing them to attend lectures by sound and capable higher grade teachers, and by their writing essays upon questions of education and method. Besides the information contained in the official regulations regarding this system and a summary of the work of the seminaries at present in existence for candidates for higher grade posts further details as to the internal work of these higher pedagogic courses may be obtained from the explanations, some of which are in the form of notices.

Between the higher and lower grade schools come the intermediate schools where only one foreign language is taught. The organization and aims of this class of schools are illustrated by the First Intermediate Girls' School and Arndt Boys' School, both at Stettin.

The more modest, though not for that reason less important purpose of the lower grade schools, the national or board-schools, is to instruct the youth in the general knowledge and accomplishments necessary for plain middle-class life. In the one-class National Schools (the simple village school of Datum-Nienhöfen in the Province of Schleswig has here been chosen as an example) boys and girls of all ages at which they must attend school are instructed in one and the same room by the same teacher. In the different conditions of town life it has been found necessary to establish numerous board-schools of several classes. The instruction given by these schools, as shown by the curriculum, summaries and exhibits submitted by the two Berlin board-schools (the 232nd for boys and the 213th for girls) embraces more than the merest elementary branches. Physics, for instance, is also taught, and each of the 260 odd board-schools in Berlin has a small well-fitted room for this purpose, the apparatus of which is shown in the exhibition in two cases.

The care which the state and the parish take of the poor children who during their early years have been able to obtain no instruction, can be seen from the exhibits of the auxiliary schools for deaf and dumb, blind, and weak-minded children at Frankfort-on-the-Main, Steglitz and Dalldorf;

these exhibits are supplemented in many directions by single municipalities as well as by the Royal Central Deaf and Dumb Institution at Munich, by Director Kunz (Illzach) and by Instructor Frenzel (Stolp). In institutions of this sort, which are often supported by liberal private endowments, the children receive instruction according to their capabilities. This not only serves to keep alive the remaining spark of intellect, which though small is often found to be still in existence even in the poor weak-minded child, but the unfortunate children themselves are also brought up by tender training to enjoy to a certain extent the happiness of other children, and to develop their capabilities and talents such as they are. In these successful institutions, which for the most part are to the children dearly loved homes, they receive an education in some trade or occupation so that they finally become independent and capable of working with their hands, and are not obliged to seek support in the form of charity. The military training establishments, including the cadet schools, follow the same curriculum as our Real-Gymnasiums, and are this year represented in the Schools' Exhibition. The qualification certificate for one-year volunteer service, obtained after successful attendance at an upper-grade school for six years, is also granted by certain German schools in foreign countries (Antwerp, Brussels, Bucharest and Constantinople). Some treatises, summaries and examples of school-work, as well as views are exhibited. We cannot here give details of the sums expended in the German Empire and in the larger Federal States upon national schools and the higher education of youth, for the training of teachers, &c., nor can we fully show how much success has been met with, how great the attendance is, what is the number of teachers engaged, nor how the pupils are divided according to the standing of their parents, their creed and the selection of a profession in after life; we might also, if space permitted it, prove how the small number of entirely illiterate is gradually decreasing, what strides the whole question of education has made in Germany, particularly during the last generation, how enormously the expenses for educational purposes have grown, and quote the sums expended in pensions for teachers and providing for bereaved relatives. All these points have been clearly brought out by numerous tables, diagrams, and curves which are on view at the Exposition, and the critical expert who examines our school exhibit will recognize the instructive tendency underlying its arrangement. But the attention of the non-specialist visitor will also be attracted for a while to the exhibits which show by models, photographs, coloured pictures or plans, the places where young Germany is brought up and fitted for its future calling in life. It is comparatively seldom that the educational institutions of Germany benefit by large donations from benevolent citizens; it is mostly left to the care of the state and the municipalities to make the necessary outlay, to build municipal schools with light healthy rooms provided with heating and ventilating plants as required by modern hygiene. The expenses of building

noted upon the models of school-houses, gymnasiums and the like, give some idea of the proportionate internal fittings, and particular attention should be paid to the exhibits shown by the most capable municipalities of Prussia, Bavaria, Saxony, Wurtemberg, Hesse and Alsace. In this Schools' exhibition of German towns there is therefore much to be seen which could not well be included elsewhere, viz., school gardens and baths, kitchens and workshops, museums and reading rooms, barracks and holiday resorts. A special department is devoted to gymnastics and school sports. games and hygiene. The literature represented by books and periodicals. the sketches and photographs and a large model of a gymnasium show that, as a result of the incentive given by our Emperor, the physical training of the German youth is in no respect behind that of other civilized countries. Any person examining the photographs of German school-boys at play and on tour in the woods and mountains, in the shower-bath and swimming, rowing and exercising in the gymnasium, must realize that in the youth of Germany, though the school discipline is strict, there still lives a fresh, free, and happy spirit. The pains we take to train the eye, to develop in the rising generation a more and more aesthetic temperament and an interest for the highest and most ideal faculty of recreation existing in man, namely, for Art—all this is the purpose of our exhibition of drawing and artistic wall-decorations. The educational appliances exhibited by the Berlin Albrecht Dürer House, and the portfolios of school drawings submitted, show in what direction the reforms in the teaching of drawing are moving in Germany, how real objects, natural or artificial, serve from the beginning as models, how colour as well as form is also considered in all grades of instruction, and how throughout the whole instruction, drawing and sketching from memory is encouraged. In addition to the artistic pictures and sculptures which are intended to train the taste of the pupils by their presence in the class room, our school exhibition is still further embellished by a number of busts. They represent in the course of instruction in the classics, heroes, thinkers and poets of the classical age. There are, however, also a certain number of German educationasts represented who have rendered great services in the education of our youth and in the development of our school system. We would gladly have arranged around Froebel's portrait an extensive collection of Froebel literature and an exhibition of the German Kindergarten work, but the space at disposal would not permit of it. It is just in this particular branch that American educationasts have now for a number of years been studying with great thoroughness the striking features of German education. The German exhibition contains a small but picked selection from among the copious amount of educational appliances at present on the market in the form of atlases, reliefs, globes, models and other apparatuses such as diagrams and text books, and has been confined to the most characteristic and novel specimens. The selection includes a few models of school furniture of modern construction as well as ingenious contrivances for assisting elementary instruction, and finally lesson books for all branches of the

lower, intermediate and upper grades of our school system. It also comprises educational treatises and books of reference in which the educationast can obtain all the information he requires upon German education, the history of German schools, their constitution, methods of instruction, didactics, school statistics, and the most recent reform movements.

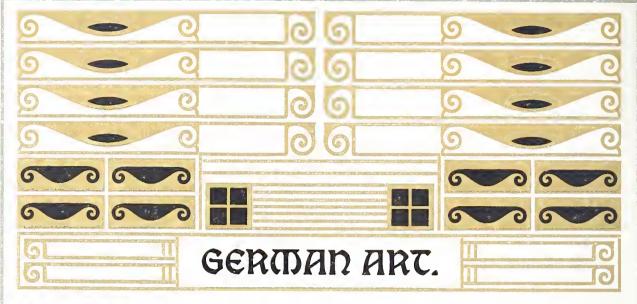
He will also be able to obtain information about the qualification certificates given by the various kinds of schools, and he will gain the impression that the way to the highest ideal of education is open to every one in Germany to-day, and that attendance at the University is no longer an exclusive privilege conferred by the humanistic gymnasiums. During the last generation new standards have been adopted and new forces have been called into the field to advance modern education. Great has been the service rendered by our Emperor in drawing attention to the necessity of schools making allowance for the altered requirements of the present age, and of adopting new systems in order to give the youth of Germany the proper equipment for the present struggle for existence. The picture which we offer the visitor to St. Louis is therefore very different to-day in many important features from that which we presented ten years ago at the Columbian Exposition. The discussions and decisions of the conference held by Emperor William II. in December 1890 have in the meantime born ripe fruit, and an Imperial Note dated November 26th, 1900, marked out the ground for the further advance of school reform on the lines of sound progress and in conformity with the spirit of the age.

It is quite impossible at an Exposition to represent in a convincing or sufficient manner the fruits and tangible results of such a work of reform. School exercise books and final examination work (there are but few examples of these) have been purposely selected so that good work is also accompanied by bad. And if these exhibits are not exactly interesting, and are open to criticism, these ordinary objects of school work display at any rate the actual results of instruction and learning; they also give the foreign educationalist the only opportunity of examining the work which has really been done and what has been accomplished; and this he can never secure from the most effective photographs of classes and written explanations of the systems followed. Insufficient and incomplete the picture certainly is, for unfortunately it is impossible to bring to a Universal Exposition a German instructor of youth surrounded by his class of attentive boys and eagerly listening girls. And there is something else which obviously cannot be made clear in books or by pictures nor represented at an Universal exhibition, but which has been busily at work for hundreds of years in the German school house; it is the idealism of German teachers of both sexes, the energy with which they work, the training and discipline of the youth of Germany, its keen attentiveness, and honest diligence.











erman Art lived and throve during the nineteenth century under different conditions from those which prevailed in the French or English art of the same period. France and England have enjoyed for centuries the possession of centres of national life which have attracted the majority of the productive forces of both countries. Artists and men of letters

who entered the capital found in it their intellectual home, and felt themselves imbued with the concentrated vital energy of the whole nation. Their creations represented not only their most ideal aims, but were further enhanced by the collective spiritual force of their country.

In Germany no such centre of national artistic life was formed. There was not a single town in which all artistic effort was concentrated in order to develop to the highest standard by constant intercourse and emulation. At least a dozen towns, large and small, attempted, independently of each other, the culture of high art, each of which endeavoured to find complete expression for the artistic power of the nation.

The natural result of this division of patronage was the attainment of greater variety, while decreasing the actual quantity of production. The artcities of Germany, owing to the variety of their characteristic features, differed materially at the beginning of the nineteenth century. These old birth-places of mediæval art play no part in its artistic movement.

Between the bourgeois culture of the times of the reformers and that of the nineteenth century, we find a period in which the numerous princes of Germany collected around them the vital forces of their territories. When in the nineteenth century the political reconstitution of the country created a new opening for the development of civil life, it was confronted everywhere by the surviving admiration of the times of absolute rule which it had adapted to its own purposes. If we wish to understand the material and intellectual condition of German art in the nineteenth century, we must not forget this particular historical development.

In the seventeenth and eighteenth centuries, the prince, as head of his dominions, comprised within his own person the whole governing power, and was consequently the patron of art also. But very little of the art of former times was left after the Thirty Years war: artists who during the heyday of mediæval culture had shaken themselves free from the ordinary professions, had, during its decline, fallen back on the formation of guilds, from whose restrictions there was no chance of escape without exciting the iealousy and conservatism of the rest of its members. Under such conditions the German art of the time could at most meet the requirements of the prince and ruler, and his taste lay for the most part rather in architecture and sculpture than in painting. This led to the engagement of foreign artists for the special purposes of those princes who were bent on adorning their palace and churches, and was the origin of the numerous schools which sprung up everywhere in Germany during the seventeenth and eighteenth centuries, organised strictly on the pattern of foreign institutions of the kind. What was taught in these schools was not the remains of the old bourgeois culture, but came from abroad. Court influence turned the eves of German art towards Italy and the Netherlands, and, in the eighteenth century, towards France. Thus the essence of German art became a re-development of French, Italian and Dutch thought, and the originators of this development were as often foreigners as Germans. The result was that in painting the national inventive power was suppressed, while in architecture and sculpture it developed to a high degree. The buildings of Frederic the Great's time, the architecture of Dresden, the palaces of the clerical principalities of western and southern Germany, Schlüter's works, and the smaller porcelain plastics are all proofs of this independent development of foreign thought. It need hardly be pointed out that the prince-patrons opened their schools in their own capitals, and not in those old bourgeois centres which had been the seats of national life during the previous era. These capitals, which at this time of the reformation were still small and unimportant country towns, vastly inferior to the great civic centres, became endowed with new life through the prince and his court; the plan of their streets, the very facades of their houses were designed less for the convenience of the inhabitants than for the decoration of the "capital and Residence." To understand the development of German art in the nineteenth century, these facts must be remembered. After the wars of the Napoleonic era, the middle classes came into greater importance, and a national feeling was born. The old bourgeois centres awoke from their long sleep, and in the second half of the century their financial power again surpassed that of the majority of the Residences, with the exception only of Berlin. Side by side with such commercial centres as Nuremberg, Augsburg, Frankfort, Cologne, Leipsic, Hamburg and Bremen,

new industrial centres in Saxony and Westphalia put their claims forward.

Large private fortunes, and a high average of prosperity amongst the middle
classes were found in places where the old productive power had fallen asleep, and a new one had not yet been developed.
In the meantimes the new state had everywhere taken the place of
the absolutism of the older Residences, preserving their traditions, and complet-
ing what they had begun.
The academies became state-institutions, and their number was increased
by the addition of several new ones created on the same pattern. The majority
of these institutions remained where the will of their founders had established
them, only exceptionally where they were most required, but seldom in the old
capitals of national life.
This is the reason why Germany became possessed of art centres where art was taught and followed in a manner similar to that of the smaller
German universities, in no relation to the movement of the times.
Dany pecularities of German art of the nineteenth century may be
explained by this particular fact, above all two:—the little resistance of German
art to foreign influence, and the loose connection between art and the most
important part of the people,—the middle and lower classes.
If Germany had had one great economic intellectual centre of art, its power
of resistance to French thought would have been greater. In considering
the question of foreign influence on the Germany of the nineteenth century, we speak particularly of French thought, for it comes first, that of England
making itself felt not only considerably later, but more indirectly. The fact
that modern German art is insufficiently connected with the life of the nation,
is shown by the circumstance that portrait painting is its weakest point:
how many great German portrait painters can stand by the side of Lenbach
of Munich, Kalckreuth of Stuttgart, or Liebermann of Berlin?
The difficulties described above were early felt, and already in the
twenties, certain amateurs in art were trying to mend matters. At that time
there existed no dealers in art who took serious notice of contemporary pro-
ductions, and the art exhibitions of the period were not worth mentionina: nevertheless the schools which in the previous century had trained artists
for the service of the princes, continued to send into the world crowds of
artists whom the middles classes of the day were unable to appreciate,
whilst the few remaining princes were practically no longer the art-patrons
of former times. As a remedy societies were formed which utilised the ag-
gregate small contributions of their members to cultivate a lower class of
art, sympathetic and comprehensible to the somewhat crude taste of the
majority of their members.
These societies had the merit of cultivating and developing the exhibition-system which was finally taken up by the state, and which, steadily
growing, began at length to introduce the art products of foreign countries.
Germany became a large international market, which by the quantity and

variety of its wares endangered the development of refined taste, and even of artistic home-production. Schools of art, out of touch with the life of the people and far removed from the economic centres of the country, art societies as patrons of an indifferent or even low class of art, exhibitions of ever growing dimensions, and in connection with them a highly developed art trade, ill-arranged connection between the artist and the public—such were the conditions under which German art developed during the second half of the nineteenth century. Of the art schools of Germany, the first places must be accorded to Berlin and Munich,—Berlin, the capital first of North Germany and later of the whole Empire, and Munich the capital of the south. Next to these come Dresden, Carlsruhe, Stuttgart, Weimar and Düsseldorf,—the last a very hothouse growth which received its academy in exchange for its famous gallery when the latter was transferred to Munich; but under the management of such masters as Achenbach, Knaus, von Gebhardt and Janssen, Düsseldorf has been able to hold its own amongst art-schools, and even to gain high repute. Frankfort-on-the-Main and Hamburg alone of all other towns had been able to develop a characteristic art without the aid of an academy. Munich and Berlin are as different to each other as are the north and south of Germany, as Prussia and Bavaria. Munich has been for decades the art-capital of Germany. The community of artists there forms almost a state within a state. From Munich impulses have gone out which carried all Germany with them, and there art has found close contact with the life of the people. For Munich has still all the characteristic features of the capital of an agricultural country. An important, in some opinions the most important part of the art of Munich, the highly developed art of caricature, has been born out of the intimacy of academic art with the genius loci of the city. Nowhere in Germany was this style of art developed so early, so perfectly and so universally as in Munich, and nowhere else so attractively. Kaulbach the great pupil of Cornelius, Schwind the masterly inventor, Spitzweg the caricaturist—from these this branch of art goes down without a break to the greatest of its living representatives, Adolf Oberländer; and if some day the life work of Fritz August von Kaulbach and Franz Stuck come to be reviewed, their caricatures cannot be omitted. In Munich appear the most important of the German comic papers, the older "Fliegende Blätter," the more modern "Jugend," and "Simplicissimus." The wit even of Berlin, in spite of many attempts, has been unable to produce anything similiar. The reason of this singular fact is, that the Munich artist lives among a people of jocular propensities and full of fun, a people which created the characteristic class of poetry known as "Schnadahüpfl." We must remember the pecularities of the Bavarian race if we wish to do justice to the Munich "genre painting" with Defregger as its principal representative; and even Leibl, the greatest of the Munich painters of modern times, is a true Bavarian.

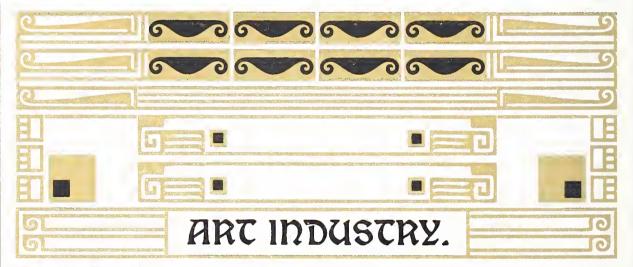
- The peculiar spirit of Munich art even takes possession of artists who come from other parts of the Empire and settle in the Bavarian capital. Even in such artists as Fritz von Uhde, who to all appearances remains uninfluenced by Bavarian fun, the local influence may easily be noted.
- Many favourable circumstances have been at work producing and fostering this predominance of art in Munich. Since the twenties, the kings of Bavaria have applied themselves enthusiastically to one of their regal duties, the cultivation of art: it was they who planted the seed of the present artistic life in Bavaria. The erection of the Crystal Palace in 1854 had a great influence of the development of exhibitions and the art trade generally. For decades the exhibitions at Munich were leading events in the art of all Germany, and it is only in later years that those of Berlin, Dresden and Düsseldorf have reached equal importance.
- Artistic life in Berlin has grown very much more slowly. Even as late as the beginning of the eighties the art exhibitions of Berlin were of but small importance. They were arranged every two years by the academy, created very little sensation at home, and none abroad. Permanent exhibitions arranged by the art trade did not exist; the intellectual life of the city was devoted to other purposes. Of late a great alteration has taken place in these circumstances, and Berlin is becoming one of the largest centres of the art trade on the Continent. Its architecture,—which for some time past has been influenced by that of Munich—and its sculpture have become predominant throughout the North of Germany. Even at Frankfort the Berlin style is predominant, though one of the most original Berlin architects. Wallot, is a native of that city. Only one city of the north ventures to compete with Berlin in this regard, Hanover, whose red brick style has been adopted for some of the Berlin churches. Enormous commissions for plastic art have developed sculptural activity to an undreamed of extent. The protection of the present Emperor is extended chiefly to statuary. Reinhold Begas of Berlin and Schilling of Dresden may be called the leading monument sculptors.
- As far as it is original, Berlin painting has often transgressed academic rules. The classic expression of this fact is found in the works of Menzel; and it is characteristic of Berlin, as compared with Munich, that this great master-spirit did not take his subjects from the life of the people, but rather from the history of the reigning dynasty. Only after reaching modern times in his coronation picture of King William did he devote himself to a description of the life of his own time. Anton von Werner is at present the exponent of official taste in the domain of painting. Taken as a whole, the present generation of Berlin painters is somewhat devoid of uniformity of character. Liebermann, though born in Berlin, is under Dutch and French influence. Ludwig von Hofmann, lately removed to Weimar, might just as well belong to Dresden or Munich; like the sculptor Adolf Hildebrand, who divides his time between Munich and Florence, and the group of rising sculptors Diez, Geyger, Volkmann, Tuaillon and Hahn, he lives in an ideal world of his own which is only connected with realism by means of the portrait.

In science and literature, especially in dramatic art, Berlin is already in-
disputably the capital of the Empire, and will assume no doubt in the near
future a predominant position in the realm of productive art. In architecture it
has already created a style of its own though the works of Wallot and Messel.
Admitting so much, we must not forget that the last decade of the cen-
tury has given new impulses to art and the love of art almost everywhere.
In the old centres of the German race, and in the Residence towns alike,
fresh life is at work. Much has been done in Cologne, Hamburg and Frank-
fort to revive the forgotten art of previous times, and to render new homage
to its productions, so long underestimated. The distinct purpose of creating
a new artistic life in the heart of the people has been connected with such
endeavours. In cities like Dresden, where Prell and Kuehl exert their energy
in developing the system of exhibitions, and in Carlsruhe and Stuttgart where
Dill and Kalckreuth stand pre-eminent, the care of the government is bestowed
on the artistic education of the people and the proper training of the artists.
Some artists show a tendency to prefer the quiet of a country-life to the
academical city. Max Klinger, to whom we owe the revival of black and
white in Germany, has left Berlin and Rome to return to his native city of
Leipsic, where he works in quiet seclusion. Hans Olde, till he lately took over
the direction of the art school in Weimar, never left his quiet country house in Holstein. In such remote and solitary places as Worpswede and Dachau
new schools of painting have suddenly been formed. Hans Thoma, lately
appointed at Carlsruhe, lived at Frankfort; his peculiar style gathered from
his home in the Schwarzwald, has only of late been fully acknowledged. In
some respects Thoma resembles Arnold Böcklin, who, though born a Switzer,
has found his artistic home in Germany, and whose influence now rules
supreme over the fraternity of younger artists.
Thus the artistic development of the new century may be expected to
form conflicting forces,—those which draw life towards the capital, and those
which tend towards decentralisation.
band band band band band
There is no lack of meritorious attempts to depict the history of German
art during the nineteenth century, but in spite of the most diligent utilisation
of existing material, they one and all fall far short of doing adequate justice
to the importance of the subject. We do not know as yet the full extents of the artistic work of our
times; a list of the names of art professors is far from throwing light on
the vigour of artistic life of Germany. Everywhere, even in the centres of
art culture, artists have been at work who are already more completely for-
gotten than if they had lived in the fifteenth century; yet the names of some
of these will in future times claim equality with those of the present leaders.
Wherever earnest inquiries are made, such artists are discovered. Their
pecularities render them incapable of competing with their more fortunate
brethren, vet history will recognise their greatness. Even in Paris, the

home of centralisation, original spirits have been known to stand apart from popular and official art; and if this is the case in Paris, how much more easily would the German incur the fate of being overlooked or forgotten. In Paris French life incessantly observes and reviews its own progress; in Germany we are so busy in studying art and life abroad that we are apt to overlook many and important things at home.

The time has not yet come for registering the names of unrecognised and forgotten artists of merit: when completed it will be found that the history of German art of the nineteenth century includes whole chapters treating of other men and other works than are now known. Yet that new history will not be poorer than that of to-day in spite of the difficulties and conflicting influences against which German art has had to contend. At the day of reckoning, German art will be able to hold up her head proudly by the side of her French and English sisters.

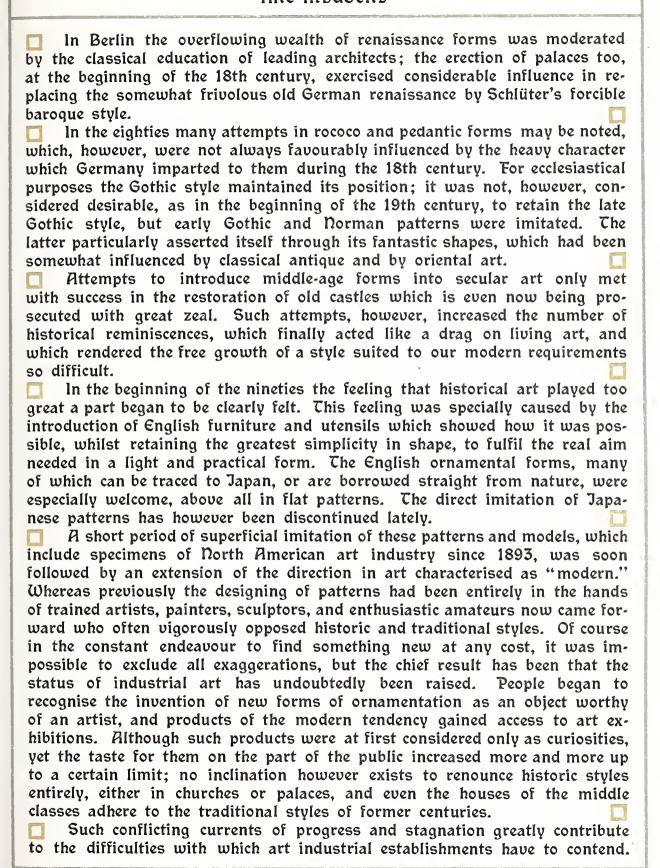
Alfred Lichtwark.

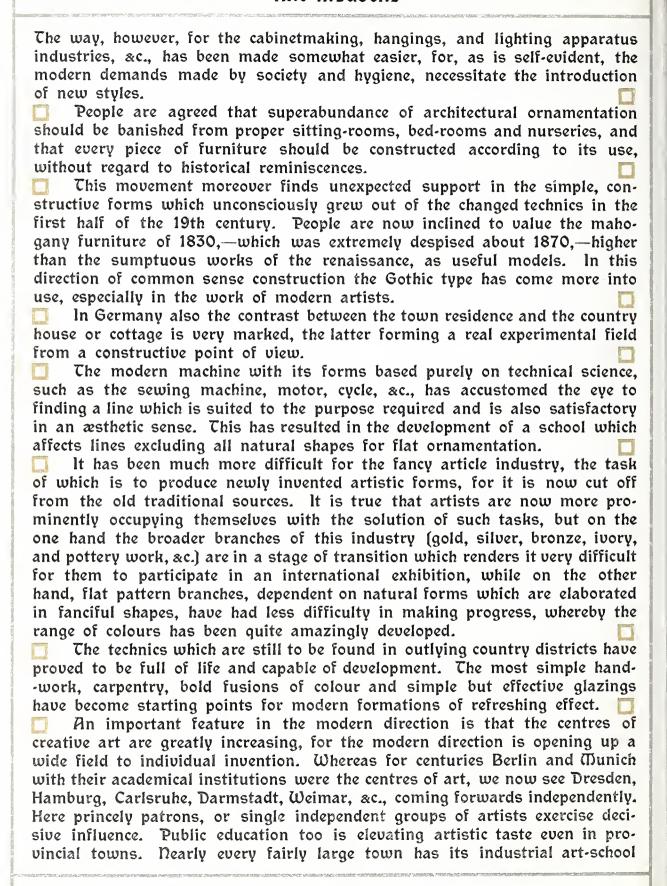




rt Industry has only been extensively and methodically cultivated in Germany during the last few decades, for up to the middle of the 19th century but little attention had been paid to the same, except in the nature of decorations for monumental buildings. The middle classes affected unassuming styles, which were influenced in the direction of

When in the course of the seventies industrial life brought greater wealth in its train, these unassuming forms no longer satisfied luxurious tastes. The elaborate forms of past ages were imitated in the desire to further embellish the appearance of dwellings. Owing to political influence, preference was shown for renaissance forms and especially for the German renaissance of the 16th century. The latter, with its great perfection of ornamental detail, met the need awakened for fanciful shapes. In this direction Dunich led the way and exercised a great influence over southern Germany, the movement afterwards spreading to the north.







immovable divans and heavy cumbersome tables from their rooms. Sofas and chairs, &c., are made in great diversity of form so as to suit all tastes, and are so lightly built as to be able to be grouped according to momentary inclination. The power of invention in this direction has proved so great that no fixed type has become the fashion, more especially as the requirements of a house are not so definitely settled as is the case in England. In Germany customs and habits vary in different towns, town districts, or even in the various flats of the same house. The invention of new styles is due more to the artist than to actual requirements.

Architectural forms being unpopular it is customary to use either light contours in imitation of plants or carpenter-like angular constructions. Many of the ideas for curved furniture must have been inspired by the treatment of wood in shipbuilding. Carving is losing ground in this kind of furniture, the surface being now brightened by inlaid work. The excellent cabinet work for which Berlin, Cologne, Mayence and other places have long been renowned, offers a splendid field for new inventions in the furniture line. Cheaper furniture of pinewood is often stained according to the English fashion, and sometimes painted to represent rural scenes.

For bedrooms, nurseries and summer-houses smooth washable furniture of bent wood or metal with rounded edges is increasing in popularity. It is becoming more and more the fashion to shape furniture in every detail in accordance with its practical use, and this can be said to be the main feature of modern taste.

Small articles of wood, ivory and kindred material suffered first of all from the disappearance of historical patterns. Original invention in this direction was not easy, but now individual artists are beginning to use wood and ivory for plastic art, and this will probably infuse new vigour into the industry.

Metal. The working of precious metals received great encouragement from the events of history and the need of objects for presentations consequent thereon. The large number of objects from former centuries still preserved in Germany offered a rich store of suitable patterns for the execution of presentation silver-ware. Such orders have become rare in the last decade. The ornamentation of tables with heavy centrepieces, &c., is no longer fashionable. Prizes, &c., for sport are, it is true, very numerous, but in extent and execution retrogression rather than progress is to be noticed. For those orders received, however, the silversmith and his modellers are uncertain as to what tendency they should follow, and content themselves for the most part with smooth forms, partly in the Empire, partly in the Japanese style with light flower ornamentation. Various original ornaments have been made at Munich by artists in phantastic forms and destined for no particular use. Glass and delft-ware articles are being made by silversmiths in light fancy shapes with a decided modern tone.

Jewelry has developed of its own accord; patterns enough have been found from modern plant ornamentation, which are well suited for imitation

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in coloured stones and enamel, and in the most fanciful style. The fresh mo-
tives obtained, however, soon become common, by being imitated in inferior wares. Enamel nainting has assured a place for itself in technical work and
and the partiting has assured a place for itself ill technical work and
has developed from the minute imitation of Limoges work to the most exten-
sive colour effects. Enamelled iron is most prominent for decorative purposes.
The bronze industry has received a great impetus from the numerous
orders in the monument line. In the last few years sculptors have begun
to do independent work for small plastics, instead of remaining satisfied with
imitating already existing models on a small scale. Gold bronze work has
been discouraged as far as private orders are concerned by the disappearance
of the taste for rococo, but much has been required for palaces of older origin;
a great deal, for instance, has been ordered for the castle in Berlin. Plastic
bronze is less in demand for fireplaces and lighting apparatus; for electric
lighting, thin smooth brass holders are used in preference, a fashion which
seems to have originated in America.
Embossed copper is best suited for the renaissance style, but is slowly
pushing its way with the new forms.
Tin and alloys of similar colour have been adapted most success-
fully to the new tendency. Instead of the detailed reliefs of byegone ages,
the mild lustre of smooth surfaces is reproduced, and a quite original style
has been fashioned (Cologne, Munich, Berlin).
Wrought iron has been accorded almost undue favour in Germany in
the last few decades, and has been used in almost every kind of ornamentation.
both in mediæval and baroque style, even in the remotest districts. It cannot
however follow the modern tendency, as constructive correctness forms the
basis of all lattice work. It is much more advantageously employed in bridges
for street traffic. A happy combination is made with it and malleable reddish-
gold aluminium bronze.
Artificial pottery. In Germany the traditions of the 18th century
of the golden age of porcelain have not disappeared. The rococo models
are preserved in the Royal manufactures of Meissen and of Berlin. In Berlin,
since 1880 numerous specimens of baroque style have been completed, some of
which are of enormous size, of exceptional technical perfection and painted in a
peculiar dull colour with flowers. It has been possible to adorn the walls of
large rooms with monumental wall pictures and pilasters. Of late (Deissen
and Berlin have greatly increased the pallets of their hard fire colours, and
have obtained phenomenal successes with their crystallising running glazes
suited to modern models.
Fayence and majolica received the best support in the stove industry.
Now that central heating has made such progress in the best houses, the
surest and best source of employment in this direction is disappearing.
On the other hand their employment as wall decorations, wall panels,
for the sides of hearths, for fountains in courtyards and antechambers, and

also for insertion in house façades is increasing. Old German bowls and similar drinking vessels, are slowly disappearing, and no progress can be

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recorded in the artistic decoration of such wares. The advance made in colouring glazing on country clayware is evident everywhere, and great ingenuity in ornamentation has been displayed in this branch.

Stone for flagstone flooring is as important as ever. The patterns are traditional. Stoneware vessels like old German jugs are not so much in demand. The larger breweries have begun to have special types made for their beer jugs.

Glazed stoneware is only used for cheaper wares with printed ornamentation. All the above named technics have been influenced by Japanese claywares with simple groundwork, running glazings, and faint, apparently chance decoration. Besides utensils intended for ordinary use, ornamental utensils of phantastic shapes are made in great quantities.

Glass retains for the most part, as far as cut table glass is concerned, its traditional forms. Blown glass on the other hand has again become very popular in the form of long slender goblet shapes, as well for ornamental as for useful glass-ware. Flashed and cut glass, and glass in running colours are made in Lorraine, Cologne and Silesia.

Glass staining is executed for churches in the traditional style (Berlin, Munich, Offenburg, Freiburg). Great development is to be observed in the vitrification with partly American glass, according to sketches in modern placard style.

Glass mosaics are now executed in exactly the style of the old Roman and Venetian mosaics (Berlin, Mettlach), so that assistance from Venice can be dispensed with even in carrying out the most extensive orders. The necessary glass liquids too are made in Germany.

Leather enjoys the greatest favour next to wrought iron. It is pressed, cut and easily coloured. The patterns have broken free from historical dependance, and follow a broad path with a predilection for the study of nature (Hamburg, Munich, Berlin).

In the textile art, clothing stuffs follow in the wake of international fashion. Silk and velvet weaving (Crefeld and Elberfeld) supply the more durable and simpler patterns in large quantities for abroad, and modern patterns of artistic design for neckties, blouses, &c. Very rich patterns for limited use are only exceptionally executed. The present fashion of embroidered tulle and gauzes is very detrimental to the silk industry.

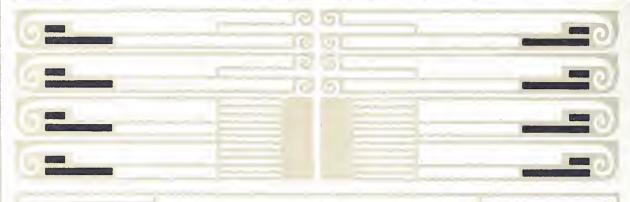
For church ornaments the most splendid patterns of the middle ages have been adopted with perfect success. Silk and woollen stuffs for furniture are for the most part adorned with light flower patterns and peculiar modern forms and light colours are coming into favour.

The linen weaving industry has a rich treasure in its 'old damask patterns with loose flower work which need no essential change to make them suit every style. The old German edge patterns are falling somewhat into the background.

As regards treatment with colours, machine embroidery offers greater advantages than the weaving of coloured stuffs, in which it is difficult to leave fairly large spaces white and restrict the pattern to definite spots.

ART INDUSTRY

For carpets, knot work (Smyrna style) has been largely ado first great success was obtained with the old oriental patterns. to supply special carpets after the style of the 18th century werspite of a large turnover, of lasting duration. They were lately reattempts to work in modern style with broken colours and undecided Tapestry and furniture coverings are being worked in Berlin exactly like French Gobelins. Besides this there is a simpler kind to the northern peasants' weaving work, especially to the Swedish, unow gained an independent position in modern placard style, and uspread far and wide. The suburb of Scherrebek in Schleswig-Hols for some time the seat of many amateur workshops in this industing Curtains in the form of thick front curtains which were form to cover windows with, have entirely disappeared. Embroidery has developed in a most brilliant manner. All the are reviving. They are sufficiently well understood for all effects to be obtained even according to modern tastes. Machine embroidery much more serviceable for artistic demands by the crank machine uhand. Pieces for furniture and clothing ready cut to pattern are man wholesale, so that this kind of decoration which was formerly so has become common property, and is making great progress in goods. Lacework has made similar strides. With the help of the embrachine, threads and odds and ends are converted into trimmings to be used quite well for skirts. Lace is prepared in countless quantities by machines, and mostly of lacelike embroidery on ground that is etched away afterwards, and duced in an endless variety of old and new patterns with the most effects. Silesia (Plauen) is the chief seat of this industry. In conclusion, a ferment of life and activity prevails in all the of art industry, and no doubt exists that the tendency for origina styles is advancing; everywhere where a change in modern requireme special efforts necessary, invention and execution are lending a help to solve the tasks which arise.	Attempts e not, in elieved by patterns. n (Ziesch) d, similar which has which has stein was ry. nerly used old styles desired to is made worked by ufactured expensive patterned proidering which can y consists d is pro- brilliant branches I modern ents make
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1. Economical and Technical Aspect.



or about the last twenty years, all those trades which are directly or indirectly connected with the production of books, their printing, publishing and circulation, have been united under the name of the "Book Industry."

The "German Book Trade Union," comprising all these

branches, was founded at Leipsic in 1884 for the artistic and technical promotion of the entire German book trade, and applied itself especially to increasing the influence of graphic art on this branch of industry. This purpose has been partly fulfilled by a series of collections which were made, and which, combined with the "Royal Saxon Bibliographical Collection" in the "German Book Industry Museum," contains everything of special value for the artistic, technical and graphic development of a book. In addition, however to the permanent exhibitions in its own buildings, the "German Book Trade Union" furthers the interests of the industry by instituting large and small travelling exhibitions of various branches of the graphic arts and crafts, within the German Empire.

Furthermore it aims at establishing a co-operative participation of the German Book Industry in special exhibitions in Germany and other countries, as also in international expositions.

In 1893 the Union was commissioned by the German Government to organise and arrange a collective exhibit of the German Book Industry at the Chicago World's Fair, in 1897 it organised the book-trade section of the Saxon Churingian Industrial and Crade Exposition, which was accommodated in a space of about 2,000 sq. metres, and in 1900 the Union was entrusted by the Imperial Commissioner with the management of the book trade group section of the German Department at the World's Fair in Paris. It may therefore be regarded as a special mark of confidence in the "German Book Crade Union" that it has not only been officially requested to manage the department devoted to the book industry in the St. Louis Exposition of 1904, but also to take charge of the photographic department there. The "Pattern

Exchange," established and published by the "German Book Trade Union," is a prominent educational factor in the cultivation of artistic taste in this Every member consents to furnish a model sheet of branch of industry. prints, of lithography or chromo-lithography, a copy of half-tone etching, or a heliographic chromo, &c., in an edition corresponding to the number of participants. In return each member receives the same number of various patterns. Foreign countries participate actively in this important enterprise, the tenth volume, of the "Exchange" published in 1902, showing that of 187 firms participating, 86 were foreign ones, of which 30 were resident in America. The official journal of the Union is called the "Archiv für Buchgewerbe," founded in 1863. It is published monthly, and contains detailed and lucid accounts of all technical and art occurrences in the book industry. The city of Leipsic having donated ground valued at 200,000 marks and located near the German Booksellers' House, the Union, aided by members of the book trade, was able to erect a structure suitable for their requirements, the cost of which amounted to 1 million marks. This building contains exhibition and museum rooms, reading and drawing halls, the offices of eighteen book associations, the Gutenberg Hall dedicated to the great inventor and other famous men in the book trade of all nations.

The following branches of the extensive German book trade deserve

special mention:

The Publishing Trade, which is occupied in buying, printing and circulating literary productions. The German book trade is divided into actual publishers and booksellers, music, art and map publishers. The chief branches of the book trade are as follows: the publisher, the bookseller, the colporteur or itinerant bookseller, and the second-hand bookseller who is generally in connection with a retail bookseller and with agencies and auctions. The directory of the German Book Trade (published at Leipsic) for 1904, shows a total of 10,624 German booksellers at home and abroad. Of these, 2,612 are occupied only in publishing books, 340 only in publishing works of art, 397 only music, 138 chiefly with art works, 464 chiefly with music, 224 only with second-hand trade, 6,184 with books, second-hand books, itinerary trade, music, maps, paper and writing material, as well as 265 that are established as agents and newspaper offices. 2,579 foreign publishing firms have agencies in Leipsic, from whence all or part of their publications are supplied.

The foreign and home German booksellers are divided as follows: German Empire 1,481 towns with 8,207 firms, Austria and Hungary 281 towns with 941 firms, the remaining European states 277 towns with 1,230 firms, America 53 towns with 178 firms, Africa 9 towns with 19 firms, Asia 16 towns

with 39 firms, and Australia 7 towns with 10 firms.

The publisher creates the trade, inasmuch as he buys the manuscript from the author, undertaking to have it printed and offered to the public. In a contract between publisher and author the number of copies of the edition, the price of the work, the printing, binding, and date of the appearance of the book have to be agreed on. In many cases the publisher under-

takes work on account of third persons; this kind of work is known as the commission publishing trade. It must be borne in mind that in many cases the publisher takes the initiative and furnishes the idea and tendency of the book, thus becoming to a certain extent its originator. The production of the book publishing trade, as far as is known, in the regular course of business during the last five years was as follows: in 1898: 23,739, 1899: 23,715, 1900: 24,792, 1901: 25,331, 1902: 26,906 numbers.

The bookseller is the link between the publisher and the buyer; he orders the books which suit his business and speciality from the publisher, sends them to those of his customers whom he supposes will take an interest in

the work, and procures such works which he has not got in stock.

The colporteur bookseller differs from the above in selling books by sending his travellers directly to the customers. This itinerant bookselling business has grown very much of late years, and deserves our consideration as long as it is used for selling good books and periodicals. The second-hand dealer sells older books which are no longer in print, though of late years the trade has been extended to the sale of modern second-hand books.

The second-hand bookseller occupies himself with trading in old books, no longer in circulation; modern books have also, however, been added by the second-hand dealer to his stock, and he does his business by means of scientifically arranged catalogues, which he offers to the public, booksellers and other second-hand dealers; he also attends auctions, and trades in autographs.

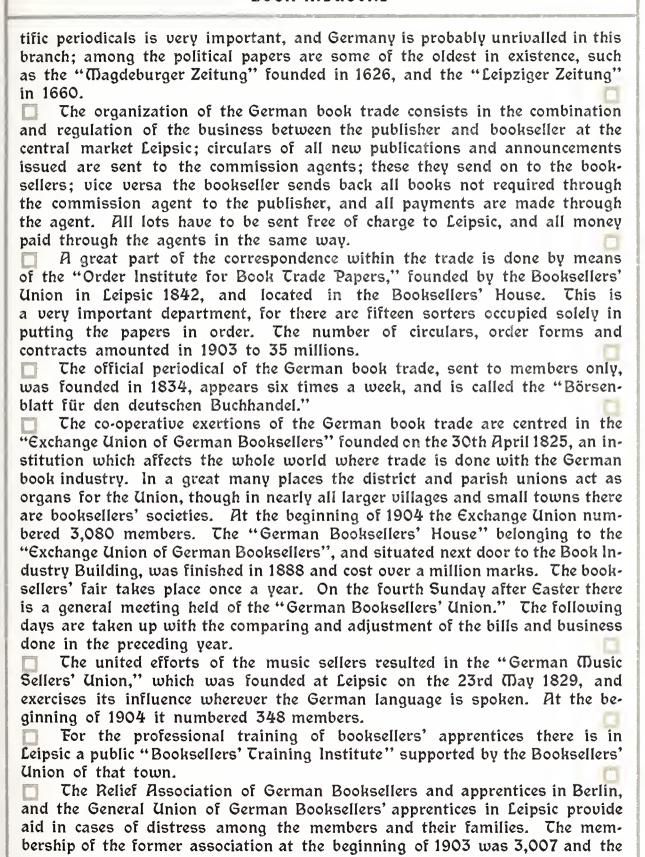
The music publisher's business is done on the same lines as the book publisher's; besides bringing out new modern music, he publishes new editions of classical works in all kinds of forms from the most splendid to the cheapest popular edition. These editions of classical works have been so carefully arranged within the last ten years that they are now first in the market of the world. The following figures show the briskness of the music publishing business in the last five years and the number of novelties offered—1898: 12,596, 1899: 11,542, 1900: 12,272, 1901: 12,376, 1902: 12,588 Works published.

The music seller's business is done much in the same way as that of the book-seller.

The commission agent transacts the internal business of the trade. The centre of the book trade is Leipsic, and the publisher and seller are in constant communication with that place all the year round. Every man engaged in the book trade must have a commission agent at Leipsic, whom he publicly acknowledges as his representative, and who can act for him on the spot.

The following book agencies were established in Germany in 1904: Leipsic 153 commission agents representing 9,373 principals, Berlin 38 commission agents representing 344 principals, Stuttgart 12 commission agents representing 679 principals.

The newspaper publishing trade is very thriving. At the beginning of 1903 there were about 12,400 periodicals and newspapers; the publication of scien-



funds amounted to 650,000 marks. 58,600 marks were expended in relief. The General Union of German Booksellers' Clerks had a membership of 2,628 (at the beginning of 1903) and its funds amounted to 650,000 marks. During the year 1902, 72,000 marks were expended on relief.

The Art of Printing. In Germany, where the art of printing originated, it has developed to such perfection that its productions can compete with those of all other cultivated lands. The art of printing in modern times is not confined as formerly to printing with movable type and pictures, but employs for many productions all the reproductive methods of graphic art. The result is that a large number of establishments at the present time are not mere printing shops, but book industrial establishments in which printing shops, type foundry, graphic art, stone and copper engraving, book-binding, &c. co-operate successfully. The first and largest printing establishment in the German Empire is the Imperial Printing Establishment in Berlin, which is chiefly engaged in producing Imperial bank notes, Imperial treasury bills, Imperial post-office stamps, insurance stamps, revenue stamps, savings-bank stamps, promissory notes, interest tables, &c. The printed matter averages 180,000,000 sheets annually, the number of officials, artists and workmen being about 1,700. The book industry is indebted to the Imperial Printing Establishment for experiments of various graphic arts, trials of new methods and the production of new patterns, type and ornaments.

From a technical standpoint the German art of printing ranks very high. The latest mechanical inventions and the most approved printing methods are employed in most medium-sized and large establishments, and experienced workmen enable the German book industry to produce such excellent results, that even foreign countries recognise their merits.

Printing is chiefly employed for publication purposes, i. e. for the composition of type and the printing of literary works designed for publication. On account of the great publishing activity in Germany this branch of industry is very prosperous. Furthermore a considerable number of foreign works are produced in the German Empire, and Germany ranks first among all civilized countries in printing oriental works (for foreign countries). In most cases, the order requires good, clear print, which generally distinguishes German publications. If no economy is required in fitting out works, the most difficult sorts of printing are performed in the best style.

Job work, which includes all kinds of printing except publications, newspapers and illustrations, equals publication printing in the extent of its operations; it is quite probable that the activity in this line exceeds all others. As far as artistic results are concerned, German job work can bear comparison with that of any foreign country, taking into consideration, that as a rule only a very short time is given for the completion of casual work. Not only type-setting and printing, but also designing as well as all sorts of graphic printing processes are employed in artistic job work, and an extensive use of colour printing is also made. Owing to the instruction

in decorative printing given by artists and art experts, the technical and artistic execution of German job printing has of late attained great perfection. The printing of illustrations ranks very high, that for illustrated newspapers being especially so excellent that it cannot be surpassed by any foreign country. Especial attention is given to the printing of coloured illustrations, and this work is gaining in popularity. The book printing-press surpasses the stone printing-press in producing large editions, so that coloured printing is very generally employed in book illustrations, and especially in newspaper illustrations where large editions are required. Several firms produce such excellent results in three-colour printing, whereby original colours of various hues are produced from three plates printed in the three ground colours, red, yellow and blue, that they receive a large number of orders from foreign countries. The perfection of these branches of the German book industry is largely due to the industrial training of all employed in the trade. For the education of apprentices there are special schools in Berlin, Breslau, Hamburg, Elberfeld, Magdeburg, Leipsic and Stuttgart. The Royal Academy for Graphic Arts and Crafts in Leipsic has educational departments for printing, book-binding wood-carving, lithography, steel-engraving, stone-printing and etching, as well as for the mechanical processes of photography; there is also a course for industrial designing. Typographical societies exist in almost all large printing centres, which aid in the education of printers by instituting lectures, libraries, collections of patterns and courses of study in graphic art. The German Printers' Association in Leipsic represents the interests of its members in state affairs, and regulates the question of wages. At the beginning of 1903 it numbered 1,100 members, or almost 2/3 of the craft belonged to it. The interests of printers are represented by the German Printers' Union in Leipsic, with a membership of 36,000 and funds amounting to 21/2 million marks. The Compulsory Accident Insurance is managed by the German Printers' Trade Association, showing a membership of 5,900 at the beginning of 1903, the number of persons insured being 114,577. The amount of damages paid in 1902 was 332,930 marks. The Corporations of Proprietors of Printing Establishments in Berlin, Brunswick, Dresden, Hamburg, Leipsic, Luebeck, Magdeburg, Osnabrueck, and Wiesbaden, as well as associations of printing house proprietors which exist in various large printing centres, represent the interests of the book industry within their respective districts. The Free Sick-Fund Association ("Freie Vereinigung unabhängiger Viatikumskassen", not members of the Union) is interested in regulating all relief matters by the introduction in every local association of reciprocal measures, and secures proper aid for its members' fund even if they change their place of work. Stone Printing, Lithography and Chromo-Lithography furnish employment for a large number of firms, and their productions have an excellent reputation in all countries. Stone printing (Lithography) is still used for one-colour work, but coloured stone printing (chromo-lithography) has developed and attained such a high pitch of excellency that many German chromolithographic establishments work almost exclusively for foreign countries (America and England). The cartographic process, based on the principles of stone printing, has grown to remarkable proportions in Germany and foreign countries. A number of large establishments are occupied solely in producing globes, cards and maps, their execution being faultless. The printing of music, in which stone printing is an important factor, has attained a degree of perfection that cannot be excelled by any other country. The largest part of musical works in the whole world is printed in Germany. The present condition of stone-printing is regulated by the Association of German Stone-Printing-House Proprietors in Leipsic, which showed a membership of 400 at the beginning of 1903.

Type Founding, Manufacture of Brass Rules, Electrotype and Stereotype Making are constantly increasing in prosperity. The products of the two first-named branches are largely exported to foreign countries, especially artistically ornamented type which increase the capabilities of the job printer and his love of work. Several German type foundries, aided by artists, have produced type in the last years which is of unexceptionable superiority. Electrotyping has progressed so extensively during the last few years that every large printing establishment is provided with electrotyping plant. For the requirements of medium sized and small printing houses there are special electrotyping establishments, whose productions satisfy the most pretentious claims and are obtainable in the shortest possible time. Stereotypy is so extensively employed since the introduction of practical and cheap apparatuses, that almost every printing establishment possesses a special stereotyping plant.

The Association of German Type Foundries, founded in 1902 at Leipsic, represents the interests of German Type Foundries. It has 36 members.

The Art of Wood Cutting occupies the highest rank from a technical standpoint without deteriorating in artistic qualities. Its chief field of activity is the illustration of newspapers and the production of technical plates, whereas wood engravings in publications have been superseded by photomechanical productions.

The Photo-Mechanical Process (half-tone etching, heliography, photo-lithography and zincography) has constantly improved and developed during the last few years, so that the productions in this line are ranked among the best in the world. In addition to the department for photomechanical work in the Royal Academy of Graphic Arts and Crafts at Leipsic, there are two private establishments engaged in experimenting with photomechanical work and in giving instruction. The "Association of United German Chemi-graphic Institutions" founded in Berlin at the beginning of 1903, represents the interests and endeavours to promote the technical development of photo-mechanical work.

Wholesale Bookbinding. The uncommonly brisk state of the publishers' business has resulted in the development of what may be called wholesale bookbinding, a trade which is chiefly represented in Berlin, Leipsic, and Stuttgart, though its customers are not only to be found throughout the

Empire, but also over the whole world. In Leipsic there are establishments which have over 100 machines and employ 300 people. Other bookbinders' establishments also do very good work, in which they are assisted by the existence of six private schools for bookbinders.

The Association of German Book Binders at Leipsic regulates all industrial and wage questions. The membership in 1903 was 90.

The Art of Engraving. There is only a small number of establishments for this art, as far as it is related to the bookbinders' trade, but the results are all the more excellent. For some bindings engraved plates are required which have to be so faultlessly executed that in printing with the several plates above and adjoining each other, each colour must be so exactly covered by the one above it that no irregularities can be detected on the finished cover.

The requirements of the book trade have given rise to a special machine industry in Germany, which has quite a large working area, and supplies firms both at home and abroad. The printing machines made by König & Bauer at Kloster Oberzell near Würzburg, by the Maschinenfabrik Augsburg in Augsburg, by the Maschinenfabrik Johannisberg of Messrs. Klein, Forst & Bohn Nachf. at Geisenheim-on-the-Rhine, are to be found everywhere, and Karl Krause at Leipsic has customers all over the world for his bookbinding and paper-cutting machines, of which the firm has made a speciality. A few statistics will help to show the present state of the German book industry:

The thirteen Great Printing Centres of the German Empire, with a List of the Book Industry Establishments, and the Persons occupied in it, for the year 1895.

	1	ok- ding	ing an	Found- d Wood aving	Pri	nting	and	graphy Zinco- iphy	and	oper Steel nting
Place	Establ.	Persons	Establ.	Persons	Establ.	Persons	Establ.	Persons	Establ.	Persons
Berlin	880	6,064	100	851	541	11,687	324	2,406	23	99
Bremen	60	228	1	3	40	586	32	283	_	
Breslau	120	683	5	42	81	1,326	52	608		
Cologne	114	360	7	20	89	1,731	53	280	2	7
Dresden	211	868	18	81	104	1,957	94	541	4	4
Frankfort-on-the-						, -				
Main	109	406	19	527	100	1,250	74	961	5	9
Hamburg	218	756	14	157	193	2,187	144	754	4	12
Hanover	82	948	7	59	60	1,358	28	748	2	4
Leipsic	247	4,381	129	1,497	170	5,641	181	2,345	12	124
Munich	216	1,035	48	127	99	1,791	72	730	32	232
Nuremberg	83	555	10	45	39	787	71	1,384	24	86
Strassburg,										
Alsace	52	167	3	12	20	774	15	148	_	-
Stuttgart	103	1,345	44	308	67	1,659	59	424	6	6
		1		1			I .			1

Berlin	545 —	Establ.	& Persons	establ.	Persons	Establ.	Persons	Establ.	Persons	stabl.	Persons
Bremen — Breslau 4 Cologne 2 Dresden 19 Frankfort-on-the- 7 Hamburg 2			80	1 074				9	Pe	Est	Pers
Hanover — Leipsic 38 Munich 22 Nuremberg 21 Strassburg, — Alsace —	551 9 1 - 1,931 106 1	56 137 56 71 105	183 296	49 148 125 264 151 278 121	536 351 754 378 680 316 3,314 853 236	18 1 1 2 34 2 28 5 11 6	1 1 3 54 8	371 3 24 15 53 33 234 12 80 186 20	10 70 152 219 228 760 83 256	219 501 470 893 556 1,252 373 1,482 1,099 364	5,826 4,512 5,771 3,711 19,796

Number of firms in the German Empire connected with the Book Industry in the Year 1895, with a List of the Persons employed, and the Amount of Working Power used.

Name of Trade	Industry altogether	Chief Esta- blish- ment	Secon- dary Esta- blish- ment	Horse power used	Persons concerned in the trade
Bookbinding	12,850	12,073	787	3,592	49,771
ves, Chemitype and Woodcutting	589	536	53	576	4,572
Bookprinting	6,303	6,022	281	13,592	80,942
Lithography and Zinc printing Colour Printing (Coloured prints, Chromo-lithography, Illustration	2,733	2,592	141	2,828	22,805
prints, Maps, Labels, &c.)	317	293	24	1,309	6,794
Copper and Steel Printing Photography, Photo-zincography, Chromophoto-	185	161	24	134	853
graphy, Heliography) Books, Art and Music Shops, incl.	4,963	4,589	374	193	11,901
of publishing and second-hand.	9,902	8,425	1,477	_	24,692
Lending Libraries	287	193	94		367
Newspaper publishing and Agencies	2,387	1,754	633	290	9,940
Cotal	40,526	36,638	3,888	22,314	212,637

Import and Export of Book Industry Products in the Years 1898–1902.

Year		inted orks	Pr ar Ste ty	iefs, int id reo- pe tes	Caler	nders	Books, Copper Engra Cards, Music Lithog Chrom graphs		d Prints, and Steel vings, raphs, olitho, Helioes, &c.	Playing cards		
	lm- port	€x- port	lm- port	€x- port	lm- port	€x- port	lmport	Export	lmport	Export	lm- port	Ex- port
	zei	ppel- itner 00 kg	zen	pel- tner 0 kg	zen	pel- tner O kg	Doppelzentner Doppelz à 100 kg à 100			zer	ppel- itner)0 kg	
1898 1899	183 186	8,530 9,450	324 392		1,863 1,951			126,711 126,167	6,337 6,694	50,505 54,223	24 29	1,135 1,271
1900 1901	298 193	9,123 8,149	375 334	765 650	1,942 1,930	2,191 3,104	44,726 46,133	140,864 141,772	6,999 6,740	61,164 59,916	43 20	1,112 1,180
1902	180	8,862	368	588	1,708	3,822	50,515	142,734	6,487	68,097	24	940

Arthur Woernlein.

2. Artistic Considerations.

The art of making a book an object of beauty has never stood higher than it did in Germany at the time when the art of printing was first invented. None of the successors of Gutenberg and his associates, either at home or abroad, have ever surpassed in strength or harmony the work which they executed when closely following the traditions of the old Gothic manuscripts.

The German Book-Art reached a second era of perfection during the period of the early Renaissance, when masters like Dürer, Cranach, and Holbein made an artistic use of the wood-cut which had been invented and perfected in Germany for the pictures and ornamentation of books. Their example was followed until the Thirty years War interrupted this progress like it did so many others. In the books of the 18th century the German copper-plate engraver rarely equalled his French prototype, although the animated appearance of the Gothic-letters and the plain style of ornamentation give evidence of the practical character of the trade in olden times. This extends through the classical period of German literature, for a whole generation, far into the nineteenth century.

German Book-Art underwent a transformation in the nineteenth century. Illustration, decoration and print were forced to follow historical styles which were laid down for them in rapid succession by architecture and the decorative arts. These tendencies are still partially apparent at the present time in the German book industry. Many styles have never disappeared, whereas others have recently been resuscitated and made fresh use of.

This is especially the case in regard to works of Romantic German authors, who since the thirties have contributed treasures of genuine German imagination, consisting of large illustrated works, editions de luxe and popular editions.

The classical style which regulated taste at the beginning of the century was not deep enough to influence types and setting very emphatically, the printers keeping to the pleasing traditions of the Gothic letters and simple On the other hand this style showed its influence strongly in illustrations. The fresco painter and cartoon draughtsman Cornelius, as well as his friends, compelled the copper-plate engraver to give up all picturesque effects and confine himself to outlines. Such outline style has, however, fallen into disuse in the German Book Industry, and the outline engraving is only to be found now in a few costly books on architecture, compiled by authors who considered it a particularly distinguished kind of technique. The effects of the romantic time which began in the thirties were more lasting. The artists who illustrated the old legends and fairy tales and the young poets of the romantic school—Moritz von Schwindt, Eugen Neureuther, Adolph Schroedter, and others, particularly Ludwig Richter, the darling of the German public knew how to suit their pictures to the ornaments and types of the time. To the Gothic running pattern they added firm medieval type in pleasing contrast to the thin Gothic letters. They treated illustrations from a draughtman's and not from a painter's point of view, either etching them in copper or drawing them on stone, or having their designs reproduced by wood-cuts. Rethel. Schnorr von Carolsfeld and others reintroduced outline wood engraving for larger works and pictures. Adolph Menzel, who served his time as a young lithographer of artistic book-ornamentation, struck out a new line in his illustrations to the History of Frederic the Great with a picturesque style of drawing which created a new school for wood engraving.

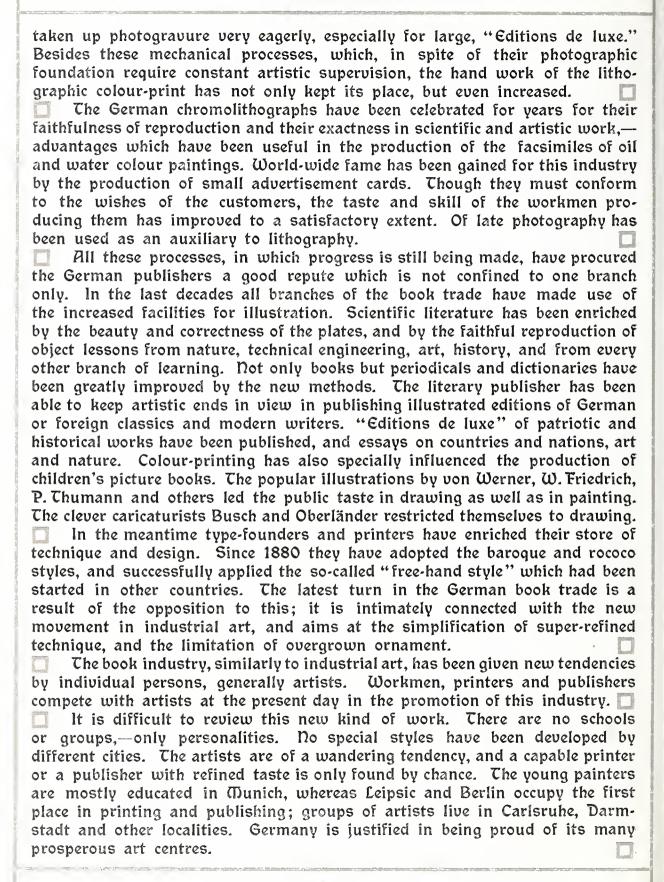
In the sixties the Mediæval style was followed by the New Renaissance. Since the founding of the new German Empire, the style called "Old German," a variety of the above, has ousted its competitors. The rise which industrial art took in those years bears fruit in the artistic development of

books and type till the present day.

The type foundries returned to the old form of German type, especially to the strong and picturesque "Schwabacher." Artists such as Rudolph Seitz, Peter Halm, Otto Hupp, E. Doepler the younger, and others who had devoted themselves to the study of the old masters, were found to reform book ornamentation, both in drawing and type. In Munich, Mayence, Leipsic, Berlin and other places the Old German style was cultivated and adopted by the better printers for job-work and ordinary printing, and still remains popular. The wholesome principles and the lively effect of this renaissance style is evident in many editions of the classical and modern poets. The more severe Gothic art was retained for ecclesiastical and liturgical work.

German bookbinding participated in this rise. The old patterns called forth the idea of working single samples with hand gilding and leather

mosaic. As the number of wealthy book-lovers is small, artisans confined themselves more to job-work suitable for testimonials and presentation copies than to costly bindings. Publishers began to bring their products to the market in a more ornamental and decorated form, in linen and half-calf bindings. The old patterns were imitated, and hand-gilding in neat pressed work was sometimes done by very skilful hands. Besides the bookbinding branch the art of leather cutting has been carried to great perfection since the seventies, when it was first revived.
Side by side with the taste for old German print, the appreciation of the Latin type was nourished, and Latin and German type are no longer mixed indicaring notely.
indiscriminately. It may be remembered that Jacob Grimm, the old German philologist,
was greatly in favour of Latin types. Since that time such type has been
very much used for scientific, business and many other purposes. Artists
and type founders took up the study of the initial letter to which Albrecht Dürer had already given so much thought. The severe cut of modern Roman
letters was replaced by softer and more regular mediæval and renaissance
shapes. The Imperial Printing Office has set a good example in this respect.
The different tendencies of the letter press found a large field for ex-
pansion in the growing importance of the publishing trade, and went hand
in hand with the progressive movement of illustrative technology. Picturesque wood engraving was toned down to great refinement by the
aid of good artists and influential schools. The illustrated papers in Leipsic,
Stuttgart, Munich and elsewhere, take the lead, particularly in the wonderful
reproductions of pictures and water-colour drawings.
Berlin is the home of the coloured wood-cut. The wood-cut can only
maintain its ground with greath difficulty for more intricate and more artistic work as the shaper photomerhapies, processes have abteined exact re-
istic work, as the cheaper photomechanical processes have obtained great recognition for all kinds of simpler illustrations. Zinc-etching and half-tone-
etching done by means of a net—the invention of Meisenbach of Munich—and
grain-etching done in copper and zinc have been brought to great perfection.
Of late years much work has been done concerning the exposure, the etching
and the printing from etchings in several colours, and more especially in
three colour chromotype. The photo-type process developed more quickly in Germany than half-tone
etching. Architectural plans and designs for industrial objects of art were
freely circulated by that means, and the process was successfully applied to
the reproduction of coloured pictures and drawings by old masters and
modern painters.
Some fine results have been obtained by photomechanical copper printing.
After having been successfully employed for the reproduction of old engravings, hardly to be distinguished from the originals, this fine process was used for
the reproduction of pictures by old and modern masters, and comprehensive
series of pictures belonging to public galleries have been published. The lm-
perial Printing Office has done exquisite work in that line. Publishers have



Graphic illustrative art, book and art printing are associated in the new
activities.
Artists of repute took the iniative in elevating the different methods of
Graphic Art above the ordinary trade standard to which it had sunk, by participating actively in the work. Twenty-five years ago Max Klinger was
successful in restoring original etching to its position among the great arts.
Several Hamburg artists have occupied themselves with decorative wood
cuts in Japanese collections in their native city: Otto Eckmann, Peter Behrens
and others may also be mentioned. Albert Krüger has produced copies of
several works of old masters in exquisitely coloured wood engraving.
The work of the last century in the domain of original lithography has
been excellent. Masters possessing unique talent have placed the results of
their fancy and observation on stone, among others Otto Greiner, who ap-
proaches Klinger's style. Others have remained painters, but contribute also
to the collector's portfolio, and for wall decorations, graceful and effective,
generally coloured sheets. A group of such artists have formed an artists' union
in Carlsruhe, and opened a workshop of their own, in order to be independent
from a technical standpoint. An instructive field for frequent experimenting in this original art has been the production of advertising placards. The best
German artists have recently completed a series of coloured wall pictures for the
school and home, and these surpass everything of the kind in other countries.
The example set by artists has favourably influenced industrial activities,
manufactories demanding better patterns and drawings and new colours. This
tendency is traced even to the popular post-cards.
The coloured poster offered a new sphere on a large scale for the
draughtsman. The decorative turn evident in all these branches of art has
been everywhere turned to good account, and has even influenced the processes
of mechanical reproduction. The consequence of the success of the poster is
that book-covers, music, title pages for newspapers, are all ornamented with
a few bright colours, sometimes by the same artists. Since 1895, two periodicals, "Pan" in Berlin and "Jugend" in Munich, have struck out a new
line. Periodicals for wit and humour have taken advantage of the new
printing methods, and several first-class artists have appeared (Ed. Thöny and
others). These are the best German illustrators at the present time.
In books, however, all the best artists have agreed not to give illustrations
a prominent place, but to furnish the text with decorations. Such decorative
effects, a combination of text and picture, take the lead. Anyone who wishes
to distinguish himself can be original, decided and German, even within these
bounds. This is proved in Joseph Sattler's beautiful and noble art pro-
ductions. His "Nibelung" is unsurpassed in the book art of all ages. Artists of the most varied talents and tendencies are occupied with books
in Germany: Melchior Lechter, a Gothic artist; E. R. Weiss, the friend of German
folk and peasant style; H. Vogeler, an artist of fine imaginative talent; J. V.
Cissarz, a graceful decorator; Peter Behrens, a strict rhythmic artist; and many
others possessing like styles.

The strength of the new German book art is to be found in the great variety of its styles.

These artists are chiefly occupied with works of living and dead poets; also with books designed for festival occasions. The best works owe their productions to a few publishers noted as prominent friends of art. printing is done in houses of the same character, of which there are only a few in existence. During the last five years ordinary printing houses have improved considerably in style. The systematic activity of the German Book Industrial Association in Leipsic has interested and directed extended circles belonging to this branch of industry. In addition to several experienced offices, a number of young printers and a new group of artists have made the most progress. The teachings of the old masters of the art of printing are again comprehended, approved of and applied in the works of modern times. Attention is given to a strong combination of colours, limited use of surface

ornamentation and harmony of type and decoration.

This work of the printers is well supported by the German type foundries. For many years no such variety of new, unique type has appeared as during the year 1900, Gutenberg's anniversary. An endeavour was made to render the Latin and German type hitherto in use fuller, stronger and more unique. An attempt was made to overcome the dry, mechanical, lifeless features which adhered frequently to the type of the 19th century. German work has also still higher aims. The German nation is the only one in Western Europe, which possesses a type of its own. There are many circles which recommend the adoption of the Latin type: there are however many friends of art, influenced not only by patriotic but also artistic reasons, who have no desire to forfeit the many superiorities of the type hitherto in use in Germany in order to be rid of its disadvantages. It is their opinion that the Gothic type is more unique and animated from an artistic point of view, and possesses more character. They call to remembrance the fact that the Gothic type has not been forgotten even in foreign countries. They are therefore endeavouring to enliven the styles hitherto used. Gothic and Schwabacher, and also to resuscitate the more simple Gothic and half-Gothic forms used in the time of Gutenberg. The first important work printed in this style was the catalogue for the German Empire for the Paris Exhibition in 1900, printed by the Imperial Printing Office, with type designed by George Schiller. The type was suited to the German, French and English editions.

Genuine artists have become interested in the various styles of type. this constituting the most difficult task in decorative art. These have been aided by a number of type foundries whose proprietors possessed courage and fine feeling. Otto Hupp, Peter Behrens and Heinz König are worthy of mention. A decorative type, possessing a strong, unique surface effect, was produced by Otto Eckmann, whose artistic career was recently cut short by an early death. A brisk, earnest spirit of competition prevails at the present time in German typographic art: the German type foundries allow no foreign establishments to excel them in artistic productions.

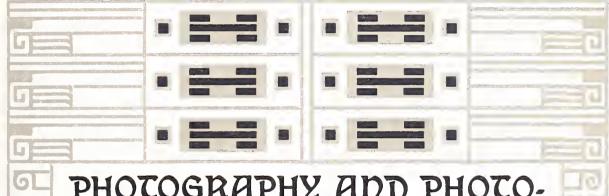
PHOTOGRAPHY AND PHOTO-MECHANICAL PRINTING PROCESSES

German book-binding has not as yet received sufficient orders for single valuable works, as the small circle of friends of art increases very gradually. Prosperous wholesale book-binding establishments endeavour to satisfy the claims of the new styles of art. They are abandoning the coarse effects which might be produced by coloured print and excessive gilding, and are employing carefully chosen and moderately decorated genuine stuffs.

Leading artists are occasionally engaged in such establishments.

The year 1904 finds German book art hard at work. All the technical results attained during the 19th century must now be converted into artistic results. Justly considered, this work is a struggle, but one that will surely lead to victory.

Peter Jessen.



THOTOGRAPHY AND PHOTO- THE CHANICAL PRINTING PROCESSES.



he photographic industry cannot be compared either in size, importance or extension to the greater industries. The whole value of its productions is but trifling in proportion, for instance, to that of the chemical industry. During the last ten years however enormous strides have been made, and photographic productions have acquired a well merited repu-

tation in the world's market. The development of the photographic industry coincides with the invention of the dry plate. By means of the dry plate, the possibility arose of rendering photography more popular, and the last decade has seen the expansion of this process in a quite unanticipated and rapid manner. In Germany the camera is the constant companion of a large number of the educated classes, and although the photographic industry only partly owes its origin to the general spread of photography, still its speedy development is greatly due to the same. On the other hand, however, this speedy development can be traced back to the progress made in reproductive processes. Photo-mechanical book-illustration has especially been brought to a high state of perfection in all civilised countries, and its productions take an important place among the means of illustration. The value of the photo-mechanical

reproductive process for the history of civilisation is due to two circumstances; firstly, that it can supply an objective photograph of the illustration, secondly, that its productions are superior to and less costly than any that can be obtained from the hand of an artist or technologist. Wood-cuts, lithographs and copperplate engravings in their different variations have competed with the mechanical reproductive process in a struggle, the energy of which has been nearly without a precedent; this struggle however terminated in a victory for the mechanical process wherever the older illustrative technologists could not hold their own by the merits of their art. To-day it is an accomplished fact, that mechanical reproduction, owing its origin and fundamental conditions to photography, has supplanted the old hand-reproduction process almost everywhere. The general use of photography, coupled with the extraordinary increase of illustrative material through photo-mechanical reproduction, has created the photographic industry in Germany.

The principal features of photographic achievements have changed with time. The portrait stood in the centre of interest thirty years ago, and in speaking of photographers one invariably meant portrait photographers. This kind of photography has however to-day become almost a thing of the past. In Germany, it is true, portrait photography as well as its mechanical application still plays an important role. The same also applies to that artistic and mechanical work which has only arrived at a state of perfection during the last few years; but taken as a whole, they have been pushed aside and have become less important for the photographic industry in the same proportion in which other photographic branches have come to the fore.

Professional photography is at present engaged in a very severe struggle. Its old representatives, who principally used photography from a technical-mechanical point of view in business, are in a bad position. The old traditions have receded more and more before the advance of new conditions. Neither has photography been spared by the tendency of the age, which has brought larger industries to the front to the disadvantage of smaller industries wherever the conditions for such a development were favourable. The average photographic productions in portraiture have sunk considerably in value to-day, and the simplification of photographic portraiture has naturally been accompanied by changes which from the standpoint of technical development cannot be regretted, but which have, however, resulted in the little portrait-studios of photographers being mostly replaced by larger industrial concerns combined with other mercantile businesses.

Thus some of the old representatives of portrait-photography have gradually disappeared, others only just manage to exist, whereas a small fraction have understood how to attain to that high perfection in their art which guarantees their thriving even under existing circumstances. Professional artistic portrait-photography originated from this movement, and its productions certainly deserve general interest. This pleasing process has been stimulated by the action of prominent amateur-photographers. Those amateurs who followed artistic photography as a hobby were able to give their ideas free scope, and

have thus shown professional photographers what can be achieved in the art; and if to-day our foremost photographers have risen to an unforeseen standard of artistic excellence, it is mainly due to the stimulus of such amateurs. The possibilities of photography in serving science and technology through its objectiveness have also been increased. The triumphs obtained in this direction are great and numerous. Not only has reproductive photography largely increased, not only do its productions take a numerically favourable place in illustrating, but they have also considerably increased in value. Germany the three-coloured print especially has reached a high state of perfection. In illustrating scientific and artistic works it now occupies an important place. The three-coloured print is adapting itself more and more in its productions to existing requirements, and the facsimile reproductions of even the most difficult originals are no longer impossible. Three-colour heliographic printing has vielded the most astonishing results in Germany, and having been developed on a purely mechanical basis it can now be employed in the most difficult work by reason of the improvement and perfection of its technic. In this branch, such names as Obermetter, Albert, Büxenstein, Schelter & Giesecke, Frisch, and others have obtained a universal reputation. Some branches of photo-mechanical reproduction in Germany have passed through a stormy epoch of development, principally caused by the popularity of picture postcards. Large sums are turned over annually in Germany in their production, and still the demand increases. It cannot however be denied that the enormous quantity of picture postcards produced has to a certain extent damaged photo-mechanical reproduction and thus caused it to degenerate. This is particularly the case in heliographic printing, which the illustrated postcard has only affected as far as quantity is concerned. The prices have also sunk in an alarming manner through wholesale multiplication. The mechanical reproductive process, in which a printing press is used. has lately met an unexpected competitor in the shape of the photographic rotary printing machine; this is a mechanical and chemical process in which bromide-silver-paper plays an important part, and was originally very limited in its sphere of activity. Germany formerly only possessed one establishment which produced the so-called rotary photographs in any quantity. To-day this establishment has not only increased its works on a large scale, but a number of other establishments have sprung up beside it as well; their number is constantly increasing, and most of these works are doing a large and successful business. The bromide-silver-postcards and other productions of this industry are sent by Germany to all parts of the world, and she dominates the greater part of the world's market in this article. If we turn to the single photographic-chemical industries, we find foremost in Germany the manufacture of photographic-chemicals, plates and paper. The increasing development of chemical industry in Germany also causes its photo-chemical productions to enjoy a well deserved reputation. The manufacture of developers, precious metal-salts and other chemical preparations for photographic purposes, forms an important part of the chemical productions

of Germany. The number of chemical works which make a speciality of photographic preparations has considerably increased during the last few years, and whereas formerly almost only raw-material was manufactured, the manufacture of photographic solutions and preparations ready for use has made great progress. Hereby the requirements of amateurs have been met.

The German photographic dry-plate enjoys general favour. Germany exports dry plates to foreign countries from its large dry-plate factories, which for the most part work with great success. Austria, Russia, Norway and Sweden particularly, and to a smaller extent also France, are customers to Germany for dry-plates. The manufacture of colour sensitive plates, and so-called photo-chromatic plates for colour-photography, has received from German experimenters an epoch-making stimulus, and industry is striving to turn this recent success to the best advantage. The manufacture of dry-plates in flexible layers, so-called films, which were imported from abroad till recently, is now making favourable progress, and the home manufactures already deserve to be classed with those from abroad.

Photographic paper, the manufacture of which, thanks to the general use of albuminised paper, was formerly almost a German monopoly, is now no longer so. Chloride of silver-collodion paper, which partly ousted albuminised paper, and in particular, different sorts of bromide silver-paper, which enjoy increasing favour, are manufactured in equally good qualities in all civilised countries.

Chloride-silver development paper, after having been first manufactured successfully in America is gradually becoming more popular in Germany, and is produced in the best quality by German manufacturers. The manufacture of photographic apparatuses has now reached a climax of technical finish, and is largely carried on in Germany. The manufacture of first class apparatuses for all branches of scientific photography, for explorations and for the increasing requirements of reproduction-technology in Germany, is almost entirely carried on at home, and large numbers amounting to a considerable value are sent abroad. The industry in cheaper apparatuses of lesser value has especially increased and become more varied. The principal seats of manufacture are Leipsic, Dresden, Görlitz, Berlin, Frankfort o. M., Munich, &c. A distinct type of apparatus such as is made in America and England for the use of amateurs has not developed in Germany. On the contrary apparatuses of very different construction and shape are produced. From the expensive apparatus in the hands of the wealthy and earnest lover of photography down to apparatuses which with plate, paper and chemicals, are sold at a retail price of 30 pfennig, all kinds are supplied by German manufacturers.

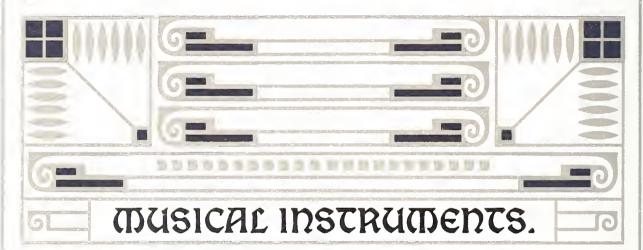
In Germany the so-called folding camera (Klappkamera) is, in distinction to the peculiar type of English, French and American camera, much sought after, although cameras of the kodak type are gaining more and more. One can say in general, that the average sale price of German apparatuses is about equal to the average price of French apparatuses, and keeps above the sale prices of English and American amateur-apparatuses. German cameras

are as a rule less adapted to the purely mechanical and simple use of superficial amateurs than is generally the case with foreign manufactures. The manufacture of photographic object glasses is of particular interest, not only because of their great value, but also because of the enormous progress shown in the scientific and technical workmanship of such productions. Steinheil who was the pioneer in the sixties and seventies in photographic optics, was followed in the eighties by Abbé and Schott who laid down its fundamental principles; on this foundation the development of the construction of photographic objectives, in which Germany took the lead, is based. Nowadays the older photographic types are only used for inferior and very cheap cameras in Germany. All better apparatuses are supplied with modern anastigmatic object glasses, which can be manufactured to-day at a comparatively low price, and in a very large variety of constructions. Side by side with the old firms in this branch, viz., Zeiss, Voigtländer, Goerz, and Steinheil, a series of young firms have lately arisen whose manufactures are highly commendable, and whose instruments, although comparatively cheap, satisfy the highest requirements. The production in Germany of modern first class object glasses has reached a high value, 15-20,000 of such instruments being produced annually, and sold not only in Germany but in all civilised countries. German object glasses are sent in large numbers to England, France, America, particularly however to Russia, Norway, Sweden, Austria and Italy. Japan also imports many German instruments. If an average price of 150 marks = £ 7 10/0 per objective is assumed, then the sale price of manufactured apparatuses amounts annually to 2-3 million marks. In addition to this the great mass of inferior and cheaper object glasses used for cheaper cameras must be taken into consideration. Their number will not be estimated too high at 100-150,000, and their average value is about 15-20 marks each. In concluding this review some statistical data may be introduced which however can only lay claim to partial accuracy. The number of photographic establishments according to trade statistics amounts to about 5.000: 12.000 people are employed in them, and indeed in about the half of these businesses there is only one assistant. Stone and zinc printing is carried on in about 3,000 establishments employing about 23,000 persons, copperplate (printing) in about 150 places with about 800 workmen, and colour printing in about 300 places with about 7,000 workmen. Not all of these works devote themselves to photography. The number of photographic studios which only occupy themselves with the production of portraits in Germany is about 4,000 with a staff of 12,000 including owners and assistants. The heliographical printing works have grown considerably in number and size of late years. There are about 200 factories at work employing about 2,500 persons. 100 establishments are occupied with enlarging and retouching photographs, and in photographic rotary printing, at least 1,000-1,500 workmen are employed. Photographic shops which look upon the selling of photographic productions as their chief business, number about 800, and there are probably about 4,000 persons occupied in these businesses. The photographic material

industry probably employs about 2,000 workmen. About 30 establishments with perhaps 2,000 workmen produce photographic object glasses. In the photographic plate and paper industry there are about 60 establishments, which give occupation to nearly 1,500 workmen.

Unfortunately it is not possible to find out how great the sale value of all the photographic products in Germany is; an approximate valuation amounts to between 30–40 million of marks. Though all the above statistics are somewhat uncertain, they suffice to prove that the photographic industry occupies an important place among the lesser industries in Germany, and that it has attained an honourable and even leading position in the world's market, which bids fair for its future healthy development and expansion.

A. Miethe.





udging from the many factories, their varied kind of manufactures, their output and large export trade, the musical instrument industry occupies an important position in the German Empire. All over the world German musical instruments are certain of finding a ready market, and as far as the value of their export is concerned, which has averaged

40 million marks annually during the last few years, no other country can compare with Germany.

The extent to which this industry has developed during the last thirty years is especially noteworthy, as it has been the means of transforming a large number of small works of modest pretensions into important factories fitted up with the most modern machinery and appliances. Although the German musical instrument industry, particularly piano making, could boast of very many noteworthy firms as far back as the last century, which did much to improve and develop the trade, it was yet very confined until after the middle of the 19th century. With the exception of Markneukirchen and Mittenwald violins, and Vogtland musical instruments, which found general favour at the London Exhibition of 1851, German musical instruments were very little known up till then in the international market.

A very marked difference was to be seen at the second London Exhibition
in the year 1862. It was wonderful how every branch of the musical instru-
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ment industry had developed in so comparatively short a time. The German
piano industry in particular had made great strides in its improvement, and
it was then that the foundation stone of the export to England, which now
yields the annual sum of about 13 million marks, was laid.
Several years later followed the political changes and establishment of the
German Empire, which facilitated trading with foreign countries; the use of
steam power and mechanical means of working also gave the industry a stimulus
in the seventies and eighties, resulting in a sudden growth which has never
been paralleled in the history of the industry either before or since.
Whilst the export of musical instruments from the German Customs
Union in 1862 only amounted to 844,550 kgs, it rose in 1867 to 1,631,200 kgs,
and the further increase of the export trade can be seen from the following

ln	Meter-zentner (100 kg)	Value in marks	
1873 1880 1898 1902	29,300 63,632 151,350 166,756	16,110,000 21,657,000 37,948,000 44,092,000	

list of figures derived from the export statistics.

The following data show how the value of the export is distributed over different countries; they have been compiled from the export statistics for 1901: Great Britain and Ireland 16,215,000 marks, British Australia 6,539,000 marks, Russia 4,731,000 marks, United States of America 3,286,000 marks, Holland 2,067,000 marks, Austrian Empire 1,506,000 marks, Switzerland 1,082,000 marks, British South Africa 1,062,000 marks, Belgium 1,032,000 marks, Italy 766,000 marks, Argentine Republic 743,000 marks, France 719,000 marks, Sweden 688,000 marks, Denmark 573,000 marks, Chili 567,000 marks, Norway 514,000 marks, (Dexico 509,000 marks, British India 482,000 marks, Brazil 395,000 marks, Portugal 297,000 marks, Roumania 174,000 marks, British North America 159,000 marks, Uruguay 142,000 marks, The Dutch East Indies 128,000 marks, Peru 121,000 marks, Portorico and Cuba 114,000 marks, Egypt 111,000 marks, China 105,000 marks, Spain 96,000 marks, and Central America 45,000 marks.

The manufacture of musical instruments is more or less spread all over Germany, but in addition of this, some important centres have sprung up and become famous for certain branches of the industry which are carried on there.

The most important of these centres is the Vogtland in Saxony, the principal places being Markneukirchen and Klingenthal; an extensive domestic industry is carried on there, and a number of factories are also engaged in

the production of string and wind instruments, harmoniums, &c., which are exported by large local firms. The number of hands employed in this neighbourhood will hardly be overrated if estimated at 5,000.

According to the official census for 1895, the musical instrument industry in Germany comprised 6,745 establishments employing 29,272 operatives; this number, however, does not include the large number of carpenters and the commercial staff belonging to the industry, as they were classified under a different heading. The distribution of the establishments was as follows: Wanufacture of pianos and organs 1,862 establishments with 15,921 persons employed; manufacture of violins 1,137 establishments with 1,782 persons employed; manufacture of harmoniums 1,649 establishments with 3,972 persons employed; manufacture of other musical instruments 2,097 establishments with 7,597 persons employed.

196 of the above works were fitted up with steam, 26 with hydraulic power, 89 with gas motors, 9 with benzine motors and 12 with electricity, making a total of 332 establishments employing motive power amounting to 3,544 H.P.

The Manufacture

of Pianos.

The annual output, which amounts to 80,000 instruments, bears witness to the prosperous condition of this Garman industry.

dition of this German industry.

In the 18th century the practical application of hammer mechanism was first made in Germany, and with this improvement piano-making was introduced from that country into France and England. During the following years a gradual development took place in German piano-making, and in the latter half of the 19th century, especially in the seventies, the industry took a sudden rise which has not yet attained its culminating point. In the beginning of 1903, there were 465 piano factories in Germany, 167 of which were situated in Berlin, 27 at Stuttgart, 21 at Dresden, 16 at Leipsic, 8 at Hamburg, 10 at Liegnitz, 9 at Zeitz, whilst the remainder were scattered all over Germany. More than half of their manufactures are exported to foreign countries. The following figures, which are based on Imperial statistics, furnish a proof of the rapid increase in exportation. The value of ready made pianos and piano parts exported was:

ln	Meter-zentner (100 kg)	Value in marks	
1880 1886	36,288 64,676	7,982,000 14,875,000	
1890 1898	79,863 111,631	18,369,000 25,675,000	
1902	123,247	28,963,000	

The principal markets for German pianos according to the statistics of 1901 were: Great Britain: 12,995,000 marks, British Australia: 6,102,000 marks,

Russia: 2,007,000 marks, Holland: 1,502,000 marks, and the South American
republics, South Africa, Belgium, Italy, and Scandinavia.
The success of German pianos is greatly due to the fact that they are
comparatively cheap, and possess all the qualities required in a good piano.
They are full and rich in tone, the construction is the most modern, and
great attention is paid to the frames being made solid and durable, and
they are fitted up with quiet elegance and good taste, as well as adapted
to the individual markets.
The branch establishments for making the different mechanical parts
of the piano have also increased. The most important of these special
branches is the manufacture of piano mechanism which was represented by
30 establishments in 1903, counting amongst their number important factories
in Berlin, Hamburg, Leipsic, and Stuttgart. Then follows the key-board manu-
facture with 50 establishments, whilst the manufacture and covering of
hammers occupied about 25 somewhat smaller firms.
These special branches not only manufacture for the German piano in-
dustry, but do a large export trade with foreign countries.
Besides these, there are a great many other factories—in the year 1903
there were as many as 280—which are not classified under the head of
musical instruments, though they manufacture the different parts belonging
to the piano, such as: cast steel strings, wires, felt, plates, bronze, iron,
and wooden parts of the piano, wooden carving, &c.
In wire strings and felt, Germany, besides supplying her own require-
ments, also carries on a large trade with foreign countries. The oldest and
most important firm for making felt for pianos has its seat at Wurzen and
Leipsic. Pivots and pins are principally made in Westphalia (Plettenberg,
Neuenrade, Werdohl), candle-sticks, pedals and handles at Iserlohn, Dresden
and Berlin; the decorative wooden parts of pianos, wood carving, &c. are
chiefly supplied by Berlin and Zeitz.
has attained a high stage of perfection in Ger-
The Manufacture many of the improvements in organ manufacture may be justly put down to German masters.
6 of Organs and organ manufacture may be justly put down to
Harmoniums German masters.
In the year 1903 there were 275 factories for
the manufacture of church-organs, of which the greater number were small
establishments working only for the home trade. There are however a con-
siderable number of large and important factories which supply both the
home and foreign markets. The pneumatic system has almost entirely super-
seded the old mechanical system.
The manufacture of harmoniums, which in the year 1903 was estimated
to comprise 45 establishments, has risen considerably of late years. The
American (sucking) system has a soft full tone, and produces altogether a
more pleasing instrument than the old-fashioned one of former years. It is
only natural that this has increased the manufacture, and a great many of
the old and new factories which have taken it up are now doing a flourishing

TUSICAL INSTRUMENTS

business. Leipsic and its surrounding districts are the chief centres for this new industry for the manufacture of organs and harmoniums which successfully compete with those of American firms. Harmoniums built on the old (compressed) system, which are still appreciated by some connoisseurs, are chiefly constructed in South Germany.

Instruments

which embraces all instruments constructed to The Manufacture of emit sounds by means of pin rollers, perforated Mechanical Musical rollers or discs, is chiefly restricted to a few industrial districts or localities.

The chief seat of the manufacture of fluteorgans and orchestrions for almost a century has been the Black Forest [Baden], and the various parts belonging to the instruments are manufactured at the towns of Freiburg, Villingen, Furtwangen, Væhrenbach and Unterkirnach. The oldest and most important factory of this description is that of Messrs. M. Welte & Sons at Freiburg i. B., which besides carrying on a considerable export trade to America has a branch establishment at New York. Lately, however, the manufacture of such instruments has been undertaken at other places, such as Leipsic, Berlin, &c. In 1903 there were 45 such establishments in the Empire doing a good export trade especially with India and Russia.

The manufacture of barrel-organs with pipes and pin-rollers is chiefly carried on in Waldkirch in Baden (the oldest seat of this industry), Berlin, Zittau in Saxony and in one or two isolated factories. In 1903 Germany had 32 factories. Barrel-organs with a clarionet-stop and perforated music-sheets, so-called "hurdy-gurdies," are manufactured chiefly in large works at Leipsic, Gera (Reuss), and Berlin.

The branch which up to a few years ago was economically the most important, is the manufacture of mechanical organs fitted with a steelcomb and perforated disc, which was invented in Leipsic, and has retained its seat in that city.

These instruments are made in the shape of musical boxes, dime-inthe-slot apparatus, cupboards and clocks, in all sizes and at varying prices; during the course of the last few years, however, fewer have been sold, as the taste of the general public has been diverted to other manufactures, such as automatic speaking instruments (Grammophones, Phonographs) and orchestrions. The factories concerned have consequently been obliged either to decrease their output, or to turn their attention to new articles (automatic speaking instruments, piano-orchestrions, &c.). Above all however the home demand for orchestrion like instruments with pneumatic and perforated sheets of notes, especially for the so-called piano orchestrion (piano combined with orchestrion), has risen quite unexpectedly, since instruments with steel combs have become less popular lately. Electricity is chiefly used to work the above mentioned instruments, and they are generally fitted up as automatic and dime-in-the-slot machines.

Piano organs, the manufacture of which is chiefly carried on at Leipsic, Zittau, and in Berlin, may also be mentioned here, as their popularity has considerably increased of late.

playing apparatuses has been added to	years the manufacture of mechanical piano this branch, and as they most probably have ave occupied themselves in their production.
Che (Danufacture of Stringed Instruments and Strings	is spread all over Germany, and is chiefly carried on in small factories and in the homes of the workers. The productions of the old Italian school still serve as models for present manufacturers. The numerous
The chief centres for the wholesale rements are Markneukirchen in the Sa Bavaria. In Markneukirchen this is patronage of the Saxon Government, State, has been erected for learning. The manufacture of the different instruments is chiefly carried on in the prices are made in Markneukirchen abecome famed for the high pitch of For the manufacture of guitars, instruments, Markneukirchen and its although Klingenthal in Saxony, Jo and Dresden have started the manufacture of gut strings and its neighbouring districts. The trade statistics of the year	nt parts of the violin and other stringed he workers' own homes. Bows of various and its neighbouring districts, which have perfection they have attained. mandolines, zithers, banjos and such like is neighbourhood has almost a monopoly, hanngeorgenstadt in the Erz Mountains, ufacture of accordion zithers with great kind are supplied by South Germany. has risen considerably in Markneukirchen in the ly half the demand of the international
© The Manufacture of Harmonicas	was carried on in Germany in the year 1903 by 135 large factories, without including the smaller ones. Klingenthal in the Saxon Vogtland, and its neighbouring
districts is the great manufacturing follow Gera (Reuss), Altenburg (Saxo and other places with only single fain manufacturing different parts of The only places of note where n	seat for accordions and concertinas; then on-Altenburg), Berlin, Magdeburg, Leipsic, actories. 50 factories were also occupied
The Manufacture of Wind Instruments and Instruments ments of Percussion, &c., with their Appurtenances.	Brass and wooden wind instruments are made in great quantities by smaller factories all over Germany; in the Saxon Vogtland however a centre of this branch is formed by the places Markneukirchen, Klingenthal, Adorf and Schæneck. Single

parts for metal wind instruments are also manufactured at Markneukirchen.

German wind instruments have become very popular, and have entirely overcome the former prejudice entertained against them.

Some firms produce excellent instruments, quite works of art in this line. In the year 1903 it was estimated that 170 establishments were employed in making brass wind instruments (including some very large factories), and 120 establishments with the manufacture of wood wind instruments; the workshops for repairing, of which there are several, are not included in this estimate.

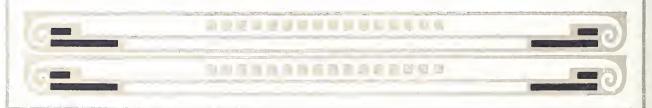
Drums and other such instruments are manufactured by some very large firms in Markneukirchen, Berlin, Erfurt, Weissenfels, &c., and in the year 1903 there were 40 such establishments, generally in connection with vellum factories.

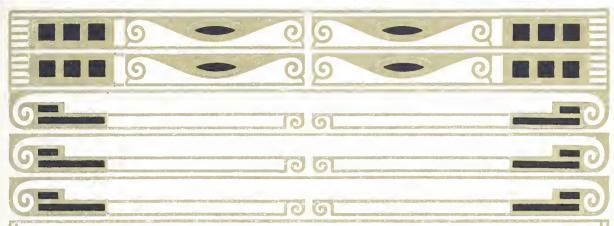
All the different parts of wind and stringed instruments (such as cases, boxes, mechanisms, mutes, rosin, &c.) are made in large quantities in the manufacturing districts of the Saxon Vogtland. Implements for tuning pianos and zithers are made in Stuttgart, Suhl and Mehlis in Thuringia. These last two places also do a large trade in metal music-stands and mounts of drums, in addition to their staple manufactures, such as tuning forks, triangles, chimes of bells, &c. Children's instruments (now no longer included in the export statistics of musical instruments) in the shape of toy harmonicas, trumpets, flageolets, fiddles, drums, &c., are made in enormous quantities in the vicinity of Klingenthal in Saxony; steel pianos, smaller peals of bells and other instruments are made in the Erz Mountain districts of Borstendorf, Eppendorf and Grünhainichen; musical boxes and dolls are made in Sonneberg in Thuringia; children's trumpets and jew's harps in Fürth and Nuremberg.

In bringing this article to a close, it is only necessary to add the Trade Unions Report on the statistics of the years 1891 and 1902 of the industry of musical instruments, which according to the regulations of the Trade Union only embraces genuine industrial establishments.

The Trade Union numbered in its 3 sections, Berlin, Leipsic and Stuttgart in 1891 a total of 824 factories employing 16,701 insured operatives, receiving 16,932,351 marks in wages, whilst the annual report for 1902 shows that there are 1,071 factories employing 24,930 able workmen and paying 27,946,858 marks in the industry. From the above statistics, which show a considerable increase in factories and operatives during the last eleven years, the statements made at the beginning of this article, that the production of musical instruments in Germany is in a constant stage of development, are both substantiated and proved.

Paul de Wit.





GERMAN CHEMICAL INDUSTRY.



he chemical industry is more than all other industries a creation of the 19th century. In former centuries the demand for all kinds of chemicals was very slight, being limited to a series of substances used as curatives which were prepared by apothecaries and doctors only to the required amount, and to several metallic oxides and mineral dyes, obtained

partly as by-products in smelting establishments, and partly prepared according to ancient and troublesome receipts by those glass-makers and potters who required them. Such products as alum were prepared here and there on a somewhat more extensive scale for the trade, and signs are not lacking which indicate that alchemists, who were obliged to make most of the materials they used with their own hands, sold a part of their products.

On the other hand, the idea of a systematic manufacture of chemicals on a commercial scale first arose towards the end of the 18th century, coincident with the laving of the foundations of the chemical science of to-day. With the recognition of the many useful applications of such products as sulphuric acid, nitric acid, soda, &c., in all branches of trade, enterprising people were found ready to undertake the manufacture of these products on a large scale, first in England and France, and later in Germany. The results exceeded their fondest expectations, as almost about the same time the scientific progress made by older industries based on dyeing and printing, bleaching, soap and glass making, and ceramic arts, made the use of chemicals everywhere necessary. Chemical industry was soon established in Germany, where it was hailed by the large number of well trained apothecaries as a welcome enlargement of their former field of work, but only a limited market was found for the products as long as other industries remained stationary. The development of the German chemical industry to its present magnitude only took place after the decided transformation of Germany from an agricultural into an industrial state, the development of means of intercourse and the opening up of foreign markets. The chemical industry of Germany however

is indebted to the excellent training which its representatives were enabled to enjoy through the progress of scientific chemical investigation, for the reliable and rapid development of its foreign relations.

Correspondingly with this course of development the sequence in which the various branches of German chemical industry have grown has differed from that in other industrial countries. In England for example, the acid and alkali industries developed very soon to such an extent that it became necessary to look to foreign markets for the disposal of the greater part of the products, but in Germany these industries made such slow progress that for many years it was impossible to avoid the importation into Germany of such products as soda, bleaching powder and caustic soda. On the other hand the manufacture of superior kinds of chemicals and pharmaceutical preparations, undertaken in connection with the old apothecary establishments, soon increased in importance, as young investigators, fresh from the schools of such men as Liebig, Wöhler and Bunsen, sought in the chemical industry a field for the application of their scientific attainments. The dyeing industry, which originated in France in the second half of the 19th century, was taken up by England with much enthusiasm, but was however developed there only to a limited extent. In Germany, on the contrary, the most favourable conditions were found for its fullest ultimate development, and it soon grew to an unexpected magnitude in spite of the fact that for a long time it remained dependent on foreign countries for its necessary raw materials. The enormous needs of the dueing industry for chemicals of all kinds, the continuous erection of entirely new chemical factories, the establishment and development of potash mining in Germany, the growing importance of the ammonio-soda process and the increasing use of electro-chemical methods of manufacture, all these and many other factors have served for the establishment of the German chemical industry, and at the beginning of the twentieth century, all branches enjoy the greatest prosperity and contribute mutually towards each others' success.

The following statements briefly show the present position of the most important branches of the chemical industry, and at the same time form a comment upon the achievements which have played especially prominent parts in the development of the several branches.

The acid and alkali industry, the sphere of activity of which was narrowly limited and definitely prescribed as long as it was restricted to the Leblanc soda process with its subordinate industries, has safely passed the crisis brought about by the introduction of the ammonio-soda process, and has been greatly elaborated. The Leblanc method has not been abandoned, but is used in the preparation of caustic soda and principally in preparing caustic potash from Stassfurt chloride of potassium. The hydrochloric acid obtained as a by-product in this process is indispensable for the dyeing industry. The enormous use of hydrochloric acid for the preparation of chloric and bleaching powder has steadily decreased, the final solution of the problem of electrolytic decomposition of alkali chlorides having opened up an

into a special branch of industry, which is carried on partly quite independently, partly in connection with great dyeing factories, but in every case completely isolated from the real manufacture of dyes. As is well known, the manufacture of coal-tar dyes has developed to an exceptionally high degree in Germany, producing without doubt the greater part of the dyes used throughout the whole world. It requires chemists of the broadest and most thorough scientific training, and receives therefore the very greatest benefit from the extreme development of scientific chemical instruction in Germany. For the purpose of its further development, however, it is necessary to maintain extensive and expensive laboratories for further investigations in theoretical chemistry. As a matter of fact a great number of important scientific achievements have issued from the laboratories of dve works. During the last two decades the number of new dyes introduced into the trade by the German manufacturers mounts up into the hundreds, of which only a few groups can be mentioned here. The technical synthesis of alizarin, accomplished toward the end of the seventies, has led to the discovery of a whole group of dye stuffs, closely related to alizarin in their nature and method of use, and similarly characterized by great purity. These dye stuffs have become of great importance for the wool-dyeing industry. Still more extensive, more diversified and by far more numerous are the azo dye-stuffs, a certain subdivision of which, the so-called substituted azo dye-stuffs, has entirely revolutionized the dyeing of cotton goods by making the use of mordants entirely unnecessary. The group of triphenyl methane dye-stuffs, to which the oldest and first introduced aniline dyes belong, was considerably enriched during the eighties by a large number of new substances which can scarcely be excelled in brilliancy, lustre and shade. By far the greatest triumph of the dye stuff industry, however, is the technical synthesis of indigo, successfully accomplished towards the close of last century, after many years of experimenting, by the "Badische Anilin- und Sodafabrik." By this discovery costly indigo dye can be prepared from naphthalene, the cheapest constituent of coal tar, by a series of chemical transformations, and thus successful competition with native indigo is rendered possible. The perfume industry has experienced a development similar to that of the dye stuffs. It began with the separation of the fragrant essences of numerous drugs, chiefly foreign. Very soon the investigation of ethereal oils began, and by means of the knowledge thus gained the preparation of these products was carried still further. Guided by the pioneering work of Tiemann on vanillin, many other syntheses of perfumes soon followed. These syntheses produced many new perfumes, substances not existing in nature, and also made it possible to prepare in the laboratory any desired quantity of perfumes, which in nature occur in only very limited quantities. The most brilliant triumph of this extensive scientific work has been the artificial production of jonon, the pure perfume of the violet. Very important results

have also been obtained of late years from the artificial composition of the
so-called complex scents (Jessamine, and ylang-ylang oils).
The perfume, soap and food-stuff industries have derived great benefit
from these achievements, and have reached far greater success by their help
than they would otherwise have done.
The industry of pharmaceutical preparations likewise began
with the separation of curative substances from imported drugs, but later
replaced these native products, so inconstant in their constituents and effective-
ness, by others whose purity and uniformity enabled the physician to place
greater reliance in them. This was specially important in the cases of those
drugs whose healing power depended on their containing extremely active
alkaloids, for example, opium, quinine, and the fruit of the strycknos species.
But in the beginning of the eighties, the investigation of the physiological
action of many coal-tar derivatives was undertaken, and these were soon uti-
lized. At the present time we possess a large and daily increasing number
of synthetically prepared curatives, many of which, for example antipyrin,
phenacetin, guajacol, &c., are absolutely indispensable to the physician. Under
this head come also the great number of antiseptics, used not so much for
external purposes as for fighting bacteria, the menacing invisible enemies of
mankind. It would almost seem that the number of achievements in this
field has been excessive.
Most recently this industry has directed its efforts towards the production
of luxuries and easily digested food-stuffs. Saccharine, the extreme sweetness
of which enables us to sweeten our food without overloading the digestive
organs with sugar, is a blessing for many sick persons. Among the great
number of soluble albumens recently put on the market, some will certainly
be found whose value stand the exhaustive test of time.
The problem of the artificial production of food-stuffs, considered on many sides as the highest aim of technical chemistry, has not yet been fully
solved. Numerous interesting experiments which bid fair to succeed have been
made in this domain; the veil is gradually being withdrawn which seemed
to prevent reseach into the finer chemical structure of those substances which
form the chief constituents of our food-stuffs.
The active life, so strongly exhibited in all of the above mentioned chief
branches of chemical industry, is reflected also in the smaller special depart-
ments which cannot be detailed here. We cannot conclude these considerations,
however, without alluding to the valuable help given to the entire chemical
activity of Germany by the multiplicity and completeness of those industries
devoted to the preparation and sale of chemical apparatus and instruments.
There are factories in Germany capable of making any desired chemical ap-
paratus quickly, intelligently, and practically. Great machine factories are
working exclusively for the needs of the chemical industry, and prepare
the boilers, values and digesters which are required in such great numbers.
Others are engaged in the production of stoneware of immense size and
capable of great resistance to fire. Others again are ready to manufacture

apparatus of platinum, nickel, lead or other resisting material, however complicated the constantly changing designs may be. And another extensive industry, in which a marked division of labour is conspicuous, is engaged in the skillful preparation of the numerous glass, metal, rubber and porcelain objects which form a part of the equipment of every well arranged laboratory. There is no doubt that the accessibility and cheapness of chemical utensils has contributed in a marked degree to the brilliant development of scientific and technical chemistry.

The economical importance of chemical work in Germany is best illustrated by the statistics which follow:

The number of workmen employed in the chemical industry and the wages paid are given in the reports of the trade association. These latter are divided into eight sections, embracing the whole of the German Empire, and are classified according to their chief centres. The number of establishments in each section, workmen employed, and the wages paid during 1898 are shown in the following table:

	Sections		Number of workmen constantly employed	Wages paid marks	
	l. Berlin	1,334 718	20,380 8,815	20,150,505 6,796,806	
	lll. Hamburg	1,059	26,313	27,700,358	
	lV. Cologne V. Leipsic	1,141 1,345	28,130 25,920	30,785,279 24,976,916	
	Ul. Mannheim Ull. Frankfort	693 527	24,535 18,218	25,541,828 21,800,601	
4	VIII. Nuremberg	722	8,530	6,455,327	
		7,539	160,841	164,207,620	

The gradual increase in the number of establishments, workmen, total amount of wages and average wage is shown by the following:

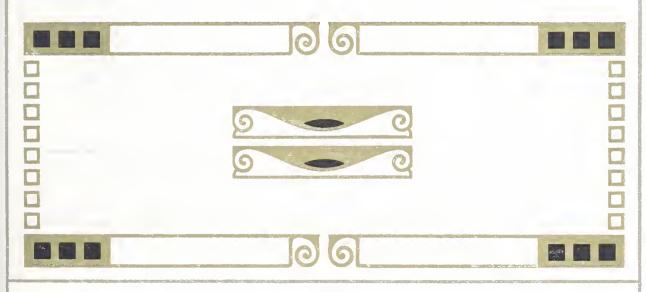
Year	Number of establish- ments	Number of workmen	Total wages marks	Average yearly wage marks	
1894 1895 1896 1897	5,758 5,947 6,144 6,316	110,348 114,581 124,219 129,827	98,621,506 103,466,498 113,727,679 120,912,418	855 894 916 922	
1898 1899	6,589 6,911	135,350	129,638,202 139,569,030	948 965·72	

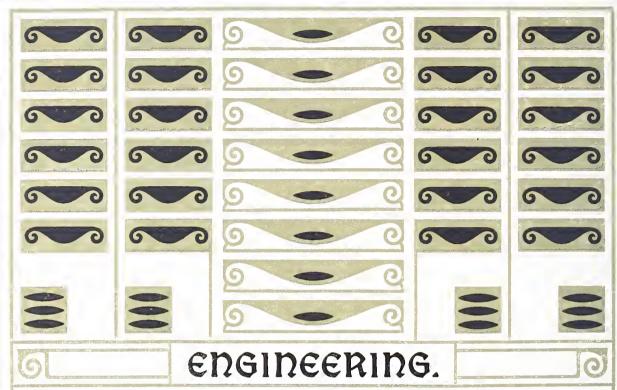
GERMAN CHEMICAL INDUSTRY

Year	Number of establishments	Number of workmen	Total wages marks	Average yearly wage marks
1900 1901 1902	7,169 7,352 7,539	,	154,921,710 159,930,488 164,207,620	1,002 ⁻ 87 1,011 ⁻ 10 1,009 ⁻ 67

- In 1898 the chemical industry paid 1,279,645 marks to its workmen in accident indemnities.
- The total value of all the products of the German chemical industry in 1897 was, according to the statistics of the Imperial Bureau of the Interior, 947,902,570 marks, and since then it must have increased to over a milliard.
- The quantities and values of the products of the single branches of chemical industry are not published. They are known however for several fundamental products, such for example as the production in tons and the value of: Sodium chloride in 1888 496,400 tons and 10,663,000 marks, 1893 504,700 tons and 13,977,000 marks, 1897 543,300 tons and 12,137,000 marks, 1901 578,800 tons and 15,730,000 marks; Potassium chloride in 1888 142,700 tons and 18,360,000 marks, 1893 137,200 tons and 17,305,000 marks, 1897 168,000 tons and 23,058,000 marks, 1901 294,700 tons and 35,129,000 marks; Sulphuric acid in 1888 398,800 tons and 13,473,000 marks, 1893 522,800 tons and 15,763,000 marks, 1897 623,100 tons and 14,958,000 marks, 1901 856,800 tons and 24,448,000 marks.
- The value of the foreign exportation of German chemical products was in 1889: 226.7, in 1894: 268.9, in 1898: 339.2 and in 1902: 386.0 million marks.
- The import statistics for the same years, namely 106.6, 106.9, 104.6 and 111.2 million marks stand in striking contrast to the above figures.

Otto n. Witt.





A. The Production of the most important Building materials.

Iron and Cement.



nyone wishing to gain a clear conception of the development of engineering in Germany during the last decades, need only cast a glance at the ever increasing quantities of the two chief building materials produced there: iron and cement.

1. Iron. In the German blast furnace works the development in the produce of pig iron has been as follows:

1884	3,600,612 tons	1891	4,641,217 tons	1898	7,316,766 tons
1885	3,687,434 -	1892	4,937,461 -	1899	8,143,132 -
1886	3,528,658 -	1893	4,953,148 -	1900	8,422,842 -
1887	4,023,953 -	1894	5,559,322 -	1901	7,785,887 -
1888	4,337,421 -	1895	5,788,798 -	1902	8,402,660 -
1889	4,524,558 -	1896	6,360,982 -		
1890	4,658,451 -	1897	6,889,067 -		

The manufacture of pig iron has therefore more than doubled itself in the last eighteen years.

The produce, for instance, of the German blast furnaces in March 1903 was: Puddle pig iron 76,361 tons, Bessemer pig iron 34,905 tons, Thomas ingot iron 510,563 tons, Foundry pig iron 153,910 tons, Specular cast iron, &c. 67,485 tons, total 843,224 tons.

The produce of basic ingot iron in Germany has increased as follows:

Year	In the converter	In the Siemens- Wartin furnace	Steel-cast- iron	Total
1894 1895 1896 1897 1898 1899	2,342,161 tons 2,520,396 - 3,004,615 - 3,234,214 - 3,606,737 - 2,973,225 - 4,364,650 -	899,111 tons 1,018,807 - 1,292,832 - 1,304,423 - 1,459,159 - 1,693,825 - 2,145,565	135,654 tons	3,241,272 tons 3,539,203 - 4,297,447 - 3,538,637 - 5,065,896 - 5,667,050 - 6,645,869 -
1901 1902	4,274,886 <i>-</i> 5,229,939 <i>-</i>	2,012,126 <i>-</i> 2,434,219 <i>-</i>	107,210 - 116,524 -	6,394,222 <i>-</i> 7,780,682 <i>-</i>

We can say therefore that the produce of ingot iron has doubled itself in the short period of six years.

2. Cement. The produce of Portland cement in Germany can be seen from the following figures:

Year	Number of factories	Manufactured casks (170 kg)	Year	Number of factories	(Danufactured casks (170 kg)	
1877	29	2,400,000	1892	62	10,550,000	
1882	32	3,050,000	1893	62	11,350,000	
1883	34	4,000,000	1894	60	11,500,000	
1884	37	4,700,000	1895	63	12,400,000	
1885	42	5,000,000	1896	63	13,150,000	
1886	42	5,700,000	1897	66	14,700,000	
1887	45	7,500,000	1898	83	17,000,000	
1888	52	7,950,000	1899	86	20,000,000	
1889	60	8,800,000	1900		23,000,000	
1890	60	9,150,000	1901	_	24,000,000	
1891	60	9,950,000	1902	95	23,000,000	

Within twenty-five years the number of factories has more than trebled itself and the amount produced has increased tenfold, while within the last decade the manufacture of cement in Germany has doubled.

These facts respecting the multiplication of the manufacture of wrought iron and Portland cement during the last few years, sufficiently testify to the enormous development of engineering in Germany.

B. Building.

1. Iron bridges. The progress made in the art of bridge building is directly due to the tremendous development of traffic. Traffic knows no bounds: it is ever demanding the solution of creater problems, no metter whether the river

demanding the solution of greater problems, no matter whether the river

mouths or valleys be so broad or so deep as to exclude all possibility of setting up firm scaffolding for the required erection. On the other hand, in cases, for instance, of ship canals or large railways, traffic is always demanding more and more space and will not brook any limitation, either by means of piles or pillars, of its free development. Now the favourable formation of the land in Germany has allowed of the narrowing of the network of traffic without making at the outset specially great demands on space. In the building of their bridges, the Germans were therefore in the happy position, up to the beginning of the last decade, of being able to occupy themselves with executing minor tasks, thus perfecting themselves so thoroughly in the theoretical and constructive formation of bridge girders as to have, in many respects, taught other nations useful lessons in their greater tasks. Ritter, Culmann, Schwedler, Gerber, Winkler, Mohr, Müller-Breslau, and many other theorists young and old found out the proper manner of making statistical calculations for even the largest spans, and these calculations have been proved by experience to be correct. Endeavours have also been made of late years to build everything in artistic form that, owing to the requirement of the most favourable distribution of material and cheapest method of execution, is necessarily simple in shape and outline. Side by side with this development, that of the production of iron has kept pace. Commencing with cast iron, which greatly limited the span and only obtained a temporary importance at the very outset, continuing with wrought iron, now used exclusively for bridge building, and finally ending with the manufacture of nickel-steel and steel cable, which promise even in their infancy to play a part in the future of bridge building. The testing of material has become important as a pioneer in the science of gauging the strength of individual portions of bridges. This too has in the last fifty years become a special science, the names of Bauschinger and Bach being prominent above all others. As early as in 1854 fairly large rods, such as are actually used, were torn to pieces at (Dunich and thereby the knowledge of the tenacity of iron and its laws was so completed as to be able to be made the groundwork of calculations. Wöhler found out that especially the difference in tension called forth by varying strain was determined by the disturbance of the cohesion of material, so that now-a-days the strain admissible is regulated according to the relation of live load to dead load, and to the manner and duration of the live load. Great attention is also being paid in Germany to the perfection of cross section. Special value is attached to a practical distribution of material round the lines of stress with an exact centric junction of the individual rods in the points of junction, to a suitable execution of the impacts, and other details, as for instance, a proper arrangement of rivets at the joints so as to avoid all side tension. While in the fifties building was still done by the superficial stay, which in consequence of the inflection of the girders pressed the edges of the walls on one side, we find the tangential stay introduced as early as 1854, the principle of which is now-a-days in use everywhere recognised as correct; the bolt stay intro-

duced later on, is only a secondary form of this principle. To meet the expansion and contraction of bridge girders caused by changes in temperature, the pendulum and roller bearings have come into use in Germany, and they have been improved in later years in the case of broader bridges by the use of longitudinal rollers on transverse ones, or by the placing of rollers slantwise on account of the transverse expansion. These German constructions are being more and more introduced. The bolt connection of all the rods meeting in one point of junction, so as to give a jointlike effect to the connection, has never been thought much of, more use being made of carefully thought out and less expensive riveting which has proved safer and more capable of resistance in cases of accident. In more recent days, on the other hand, in cases of broad span bridges jointlike over-lappings of cross girders have been introduced in Germany, so as to avoid the very considerable additional tension caused by firm riveting. In fact the Germans have been incessantly studying and improving every detail not only of building, but also of the calculations necessary thereto. Special and systematic attention has been paid to the examination of the influence exerted by a single load on the individual parts of the bridge over which it is passing. These methods are so improved that now-a-days any scientifically trained and experienced constructor will succeed, without meeting insuperable difficulties, in accurately determining by means of calculations and with the help of "lines of influence" the most unfavourable distribution of load for every possible system of girder, and thus be able to calculate exactly the highest possible demands that will be made within the range of practical requirements on any portion of the structure under consideration. With the help of the representation of elastic and other changes of shape in the individual portions of "statically indefinite" girder-shapes, which often also meet higher æsthetic demands, the play of forces can always be followed from their point of application to their disappearance in the ground. After Germany had become financially stronger, her engineers were therefore easily able to solve the greatest problems in building with skill, gained by thorough schooling in theoretical learning and practical knowledge. This is best demonstrated by a list of all the iron bridges of over 70 metres span, from which it will be seen that before 1890 only fifteen were in existance, although before this date most of the railroad building had been completed. Since 1890 no less than twentytwo iron bridges of over 70 metres span have been erected. Old Iron Bridaes. Before 1890.

no. Date	Name, locality of bridge, and	Builder or		ings:	
		girder system	designer	ber	metres
1.	1850-1857	Railway bridge over the Vistula. Parallel girders with trellis- work	Lentze	6	121

no.	Date	Name, locality of bridge, and	Builder or	Oper	nings:
170.	Date	girder system	designer	Num- ber	Width
2.	1850-1857	Railway bridge over the Nogat at Marienburg. Parallel girder with trelliswork	Lentze	2	98
3.	1855	Railway bridge over the Rhine near Cologne. Parallel girder with trelliswork	Lohse	4	98
4.	1860-1862	Railway bridge over the Rhine near Mayence. Pauli girder with square-framed work	Pauli. Gerber. Werder	4	105
5.	1862	Railway bridge over the Rhine near Coblentz. Arched rail- way bridge	Hartwich	3	97
6.	1865-1867	Railway bridge over the Rhine near Mannheim	Benkiser	3	90
7.	1863-1864	Railway bridge over the Rhine near Griethausen	Hartwich	1	100
8.	1868-1870	Railway bridge over the Elbe near Hamburg. Lohse girder	Lohse	3	96.35
9.	1868-1870	Railway bridge over the Elbe near Harburg	Lohse	4	96-35
10.	1869	Foot bridge over the Main at Frankfort	Schmick	1 2	79·69 39·56
11.	1873-1875	Railway bridge over the Vistula near Thorn. Half parabolic girder	Schwedler	5	94
12.	1876-1879	Railway bridge over the Rhine near Coblentz. Arched bridge	Hilf. Aktenloh. Dörenberger.	2	106
13.	1880	Road bridge over the Saale near Calbe	"Gutehoffnungs- hütte"	1	104
14.	1883-1884	Road bridge over the Rhine near Mayence	Lauter	5	102
15.	1884-1887	Road bridge over the Elbe near Hamburg	A. Meyer. Gleim. Engels	3	101
	m	ore Modern Iron Bridges.			
		A. Arched Girders.			
1.	1888-1890	Railway bridge over the Nogat near Marienburg	Schwedler. Mehrtens	2	103.2
2.	1888-1891	Railway bridge over the Vistula near Dirschau	Schwedler. Wehrtens	6	129

Date Name, locality of bridge, and		Builder or	Openings:	
Date	girder system	designer	Num- ber	Width metres
1889-1890	Road bridge over the Neckar near Mannheim. Gerber girders. Suspension form	Gerber and Rieppel	1 2	74·70 56·15
1890-1893	Railway bridge over the North Elbe near Hamburg. Lohse girder	Lohse's system ("Gutehoffnungs- hütte'')	3	101
1891-1893	Railway bridge over the Vistula near Fordon. Semi parabolic girder	Mehrtens (Hark- ort, "Gutehoff- nungshütte")	5 15	98·5 61·12
1893-1895	Railway bridge over the Rhine near Roppenheim. Semipara- bolic and parallel girder	General Imperial Railway board	3 4	92·0 31·05
1898	Imperial footway over the Upper Spree near Berlin. Outrigger girder with middle joint, hanging supergirdle, and ris- ing arch	Müller-Breslau	1 2	86·0 43·0
1903	Railway bridge, single track, over the Havel near Brandenburg. Semi parabolic girders and half diagonals	Bernhard	1	90.0
1903-1904	Road bridge over the Ring Rail- way near Berlin. Gerber girders	Hedde	1 2	108·0 60·0
	B. Arched Bridges.			
1891-1892	Road and railway bridges over the Emperor William Canal near Gruenenthal: Lunar shaped, double jointed square-framed arches	Greve	1	156·5
1892-1893	Road and railway bridge over the Emperor William Canal near Levensau. Double jointed square-framed arches	Lauter. "Gute- hoffnungshütte"	1	163-4
1893-1897	Railway bridge over the Wupper valley near Müngsten (Empe-	Rieppel	1	170
1895-1896	less square-framed parallel girder with pillar Road bridge over the Danube near Straubing. Double-jointed	Rieppel	1	91
	1890-1893 1891-1893 1893-1895 1898 1903 1903-1904 1891-1892 1892-1893	Road bridge over the Neckar near Mannheim. Gerber girders. Suspension form Railway bridge over the North Elbe near Hamburg. Lohse girder Railway bridge over the Uistula near Fordon. Semi parabolic girder Railway bridge over the Rhine near Roppenheim. Semiparabolic and parallel girder Imperial footway over the Upper Spree near Berlin. Outrigger girder with middle joint, hanging supergirdle, and rising arch Railway bridge, single track, over the Havel near Brandenburg. Semi parabolic girders and half diagonals Road bridge over the Ring Railway near Berlin. Gerber girders B. Arched Bridges. Road and railway bridges over the Emperor William Canal near Gruenenthal: Lunar shaped, double jointed square-framed arches Road and railway bridge over the Emperor William Canal near Levensau. Double jointed square-framed arches Railway bridge over the Wupper valley near Müngsten (Emperor William Canal). Jointless square-framed parallel girder with pillar Road bridge over the Danube near	1889-1890 Road bridge over the Peckar near (Dannheim. Gerber girders. Suspension form Railway bridge over the Porth (Sibe near Hamburg. Lohse girder Railway bridge over the Ulstula near Fordon. Semi parabolic girder Railway bridge over the Ulstula near Fordon. Semi parabolic girder Railway bridge over the Rhine near Roppenheim. Semiparabolic and parallel girder Railway bridge appear to the Upper Spree near Berlin. Outrigger girder with middle joint, hanging supergirdle, and rising arch Railway bridge, single track, over the Havel near Brandenburg. Semi parabolic girders and half diagonals Road bridge over the Ring Railway bridge over the Ring Railway near Berlin. Gerber girders B. Arched Bridges. Bernhard Hedde	Date Grafity of bridge, and girder system Gesigner

		Name, locality of bridge, and	Builder or	Oper	ings:
no.	Date	girder system	designer	Num- ber	Width metres
5.	1897-1899	Road bridge over the Rhine near Bonn. Double-jointed square- framed arch	Krohn	1 2 1	187·2 93·6 32·5
6.	1897-1898	Road bridge over the Rhine near Düsseldorf. Double - jointed square-framed arch	Krohn	2 1 1	181·25 60·36 63·36
7.	1897-1899			1	57·02 50·64
		Road bridge over the Rhine near Worms. Lunar shaped double- jointed square-framed arch	Rieppel	1 2	105·6 94·4
8.	1897-1899	Road bridge over the South Elbe near Harburg. Square-framed arches with tires	Rieppel and Gleim	4 6	109·1 31·15
9.	1898-1900	Railway bridge over the Rhine at Worms. Square-framed arch with tires	Seiffert and Barck- haus. Harkort	2 1 17	102·2 116·8 34·5
10.	1901-1903	Road bridge over the Elbe at Magdeburg. Square-framed arch	Union Dortmund. Holzmann	1	135
11.	1903-1904	Road bridge over the Spree near Berlin. Through girders with centre arch	Bernhard	1 2 1	78 37·5 6·0
		C. Suspension-Bridges.			
1.	1891-1893	Road bridge over the Elbe near Loschwitz. Braced suspen- sion-bridge	Köpke	1 2	146·68 61·76
2.	1897-1898	Road bridge over the Argen near Langenargen. Braced cable- bridge	Leibbrand and Kübler		72

2. Arched bridges. The progress made in the building of iron bridges goes hand in hand with that of arched bridges. The cost of keeping the latter in repair being less and the æsthetic form being pleasing, the public generally prefer them to all others. The progress in this kind of bridge has been very marked in the last decade, and is due chiefly to the great advance in the theory of their structure and to the careful examination and testing of the materials used, which latter fact has also caused a great improvement in the quality of the mortar. The study of the theory of vaults has thrown much light on the theory of arches. The introduction by Köpke of Dresden of joints in the crown and abutments of arched bridges, has rendered

it possible to build bridges of larger span. Concrete has successfully taken the place of stone set in mortar; iron too, of different thicknesses is used for strengthening purposes, thus rendering it possible to form extremely light and bold arches.

Lately fairly large stone bridges of more than 20 metres have been built in Germany, as the following list shows.

Date of building	Name and locality of bridge	1	nings: Width metres	Breadth metres	Material	Designer and builder
	1. Arches	of N	Jasonr	y.		
	Road bridges over the Murg:					
1886	near Hesselbach	1	30.4	3.9	Quarry-	
1888	near llgenbach	1	21.5	3.9	stone	Rheinhard
1889	near Hutzenbach	1	33.2	3.9)	
1890	Railway bridge over the Maine		25.336		'	Leibbrand
1891–1892	Railway bridge over the Maine near Kitzingen	6	36.532	4·2		Hoffmann
1884–1889	Emperor William Bridge in Berlin	1 2	22·2 8·2	26	Granite	Hobrecht and Pinkenburg
1884-1887	Flood bridge of road bridge over the Elbe at Hamburg	4	21.30		Clinker	Gleim and Engels
1894–1895	Valley of the Wertach near Nesselwang	6	up to 27.50		Quarry- stone Masonry	
1889-1891	Hercules bridge in Berlin	1	23 ⁻ 36	27.50	Clinker	Hobrecht and Faensen
1895-1896	Oberbaum bridge in Berlin, Road bridge and overhead line	7	up to	27.60	Clinker	Hobrecht and Bernhard
1892–1895	Road bridge over the Oder at Frankfort	8	27·6 30	13	Clinker	Lauter
- 0	2. Arches of Masc	nry	with A	butmen	ts.	
1885	Enz bridge near Hœfen	1	28)	
1887	Murr bridge near Marbach	1	32.0	6∙2		
1898	Murg bridge near Baiers- bronn	1	33.0	6.6	Free- stone	Leibbrand
1890	Forbach bridge near Baiers- bronn	1	25.0	6.6		

Date of building	Name and locality of bridge		nings: Width metres	Breadth metres	Material	Designer and builder
	3. Cement Arches a	and u	ith Ab	utmen	ts.	
1888	Road bridge over the Wer- bach near Erbach	1	29		lron	
1893	Road bridge over the Da- nube	1	50	8	lron	
1894	Road bridge over the Da- nube near Munderkingen	2	22	4·1	Lead	
1895	Bridge over the Neckar near Muehlheim					Leibbrand
1895	Bridge over the Lein near Gemuend	1	23-1	5-6	Lead	
1895	Bridge over the Neckar near Gemmrigheim	4	38	5.5	Lead	
1896	Road bridge over the Da- nube	2	23.0		Lead	Braun
1895	Road bridge over the Da- nube near Inzigkofen	1	43.0	3.8	lron	Leibbrand
1894	Railway bridge over the Elbe near Dresden	1 5	15·6 31·35		Stone	Köpke
1901	Road bridge over the Isar at Munich	1	64	18	Steel	Sager and Wörner
	4. Bı	idge	s.			
1893	Road bridge over the Saale near Ziegenrueck	1 1 1 1	13·6 30·0 12			
1894	Road bridge over the Saale near Walsburg	1 1 1	18 29 12			Könen
5. C	ement Arches without Ab	u t m e	nts. Q	uarrys	tone Cen	nent.
	Rega bridge near Plathe	2	20.5)
	Zschopau bridge near Wald- heim	2	22.5			
	Persante bridge near Cœrlin	3	22.67			Liebold
	Saal bridge at Saalfeld	3	25.85			
	Lippe bridge near Haltern	3	30			

Iron superstructures, ceilings and roofs. The introduction of iron constructions in overhead building has made corresponding progress to that of the development of iron bridges. Attempts to minimize the dangers attendant on iron constructions in cases of fire have been made in great number, and the results have contributed more and more to the forming of regular rules, among the most important of which seems to be the surrounding of the supports and girders with fireproof material. The increasing recognition of the transmission of tensile strain by the laying of iron in masonry built in coment, a body which can of itself assentially only
iron in masonry built in cement, a body which can of itself essentially only bear compression stress, has resulted in a large number of lighter, stronger
and better fireproof roofings being used of late years in place of wooden
beams and arches.

The most popular kind of roofings are those of indented bricks with strap iron bands (Kleine's system), and concrete with round iron cores (Könen). It is in the construction of roofs that iron has come most into use. In the case of large halls and domed roofs, as in the building of bridges, compensation and safety are mostly due to the progress of the theory that enables one to build useful constructions on the basis of exact calculations for every form and shape.

The introduction of arched roofs with and without joints, as well as without ties, in order to compensate the lateral pressure, is especially worthy of mention. This kind of bridge allows the iron construction to be displayed because of their pleasing architectural shape. The following are some of the most noteworthy halls of modern days in Germany:

	Length metres	Breadth metres	
Large hall in the Reichstag, Berlin Philharmony Concert hall, Berlin	28·0 35·20 74·75 43·26 37·0 54·0 38·82 50·5 60·0 52·8 44·0 35·65 metr	22·0 25·10 22·26 25·26 34·0 32·0 28·26 25·0 29·0 27·6 36·0	

	The	last	named	l cupo	la,	constru	ıcted	by	Müller-Breslau	18	397/	1898,	is
-	-			•				the	circumference	at	the	base	to
the	top c	f the	cross	nearly	60	metres.	•						

The following are the chief measurements of the large railway stations in Germany:

	Length metres	Breadth metres
Schlesischer terminus, Berlin	207.28	37.7
Anhalter terminus, Berlin	167.8	60.7
Bremen	131.0	59.3
Frankfort-on-the-Main, three halls, each	188·0	56.0
Cologne, central hall	255.0	65.0
Mayence	300.0	42.4
Hamburg, central hall	175.0	73.0

C. Hydraulic Engineering.

Experience plays a greater part in hydraulics than in any other branch of engineering.

It is by the lessons learnt from such experience and the benefits obtained therefrom through the medium of literature, congresses, and meetings, by the reports of the technical representatives at the different German embassies, and by their scientific examination and confirmation, that the theoretical foundation of hydraulics has been laid. The execution of the ideas lies in the hands of state administration, or large communities, or even of capable contractors, the number of which has considerably grown of late, a fact which has greatly conduced to the advance of economical science. The ever increasing demands of traffic supply the incitement for new undertakings and new problems, and proportionate thereto is the progress made in other directions in technics, especially in that of the manufacture of machinery, causing the continual perfecting of implements and machines, which in their turn render it possible to work cheaper and faster than before, and incite people to fresh enterprises.

Excavating and dredging, both on dry ground as well as under water, has made great progress in Germany, and has resulted in the improvement of the suction-dredger. This is shown by the fact that the cost of dredging has been reduced by a tenth, and amounts under favourable circumstances now-a-days in Germany to not more than 0.16 marks per cubic meter, while the working capacity of large dredgers has risen to several thousand cubic meters per hour.

1. The regulation of rivers. The object of all work connected with the regulation of rivers is to render them navigable to the greatest extent, and to facilitate the outlet of their flushwater. By the aid of groins and parallel works, of fascines and ballasting, and many other means, the river profile is uniformly regulated and definitely limited so that it is exactly filled by moderate quantities of water. These works can be regarded as complete in nearly all German rivers. On the other hand those for the regulation of the ebb and flood are as yet incomplete. The first steps are now being taken, after exhaustive and extensive preparations, towards the retaining of the high water of the Oder in the hills, in dams, in order to obviate sudden danger and to lax up supplies of water for times of drought.

A splendid achievement in the masonry line was completed in 1890-1895, viz. the cutting of the mouth of the Weichsel, 7.1 kms in length, for the better abduction of drifting ice and high water. 2. River canalisations. Great progress has been made in the navigability of rivers by the formation of movable weirs, the object of which is to dam up small quantities of water, which can be crossed by locks with chambers. This plan was first adopted in the sixties in the case of the Saar, and was then followed in the Brahe, Spree, Main, upper Oder, Fulda, Ems and Mosel, which are now navigable for ships of from 300 to 400 tons burden. 3. Improvements in river mouths. Rivers opening out into the Baltic, which do not suffer from floods, have as a rule delta mouths. Here most of the rivers are peculiar in that they do not flow direct into the sea, but first enter so-called "haffs" which are connected with the sea by narrow canals. As these "haffs" become silted up, the chief task is to keep them free. Moles are necessary, 300-800 metres long, to keep the mouths of the canals the right depth, and maintain the strength of the outflowing water in spite of the sand deposited by the coast currents. The mouth of the Oder is kept navigable as far as Stettin for ships of 7 metres draught, that of the Pregel as far as Kænigsberg has a depth of 6.5 metres, that of the Nogat up to Danzig 7 metres, whilst Luebeck is about to deepen the mouth of the Trave to 8 metres right up to the town harbour. The rivers which flow into the North sea form a flood funnel. In consequence of the entrance of the high tide into this funnel, the actual flood water is dammed up, and at ebbtide carries out the silt into the sea, gradually heaping it up at the mouth in such a manner as to become a hindrance to shipping. Quite a considerable work is being carried out for the improvement of the mouths of the Weser and Elbe. The funnels at the mouth are altered in such a way as to increase the amount of flood water which enters. Especially noteworthy are the works constructed by Franzius at the mouth of the Weser, which were begun in 1887 and ended in 1893, by which the navigable depth for ships was increased as far as Bremen, to 6.3 metres. 4. Marine and inland shipping canals. Great activity is now prevailing in Germany in the direction of ship canals in the interior. Between 1890 and 1898 the most important canal constructed was that between Dortmund and Ems, which cost a round sum of 75 million marks, and is 2.5 metres deep and 18 metres broad at the bottom. It is 248 kms long, and contains besides 21 sluices, the celebrated shiplifter near Henrichenburg, an iron troughsluice built by Mr. Gerdau of the firm of Messrs. Haniel & Lueg, under the direction of Offermann, which can be raised and lowered 14 metres by means of 5 floats 14 metres high. Further, we must mention the Elbe-Trave canal constructed by Rheder and completed in 1899, which is 67 kms long, 2.50 metres deep and 22 metres broad at the bottom. It contains 7 sluices with exceptionally convenient arrangements for traffic constructed by Messrs. Hotopp. The Teltow canal was begun in 1901, and its most important sections have already been completed. It is 37 kms in length, 20 metres wide at its

bottom, and has a depth of 2.5 metres in the centre. It has been con-
structed for ships up to 600 tons burden, and is fitted up with electrical
towing arrangements. Although it possesses only one lock with a fall of three
metres, it serves to avoid and shorten the waterways leading through Berlin.
Messrs. Havestadt and Contag were the contractors who executed the work.
The Rhine-Elbe canal, of which the Dortmund-Ems canal is a part,
and which is destined for the same cross-sectional measurements, is nearing com-
pletion. The means have been granted for the Dortmund-Rhine canal 39.5 kms
long and the central canal from Bevergen, a point on the Dortmund-Ems canal, to
Heinrichenberg on the Elbe 325 kms long, with which the canal system of the
Weser from Bremen to Hameln and a number of cross canals are connected.
The marine ship canal—"Emperor William canal"—between the North
and Baltic sea, completed in 1894 by Bänsch, is 100 kms long and 8.5 metres
deep, and is provided with two end sluices; it costs 150 million marks.
It takes twelve hours to pass through the canal. In 1901 the tonnage which
passed through amounted to 4,285,000 registered tons, and the receipts to
2,113,000 marks. The Konigsberg Saalcanal was constructed between 1890 and
1901, and is 40.5 kms long, 30 metres in width at the bottom and 6.5 metres
in depth. The cost of construction was 12,300,000 marks. Three hours are
required to pass through the canal, and 1,210,000 registered tons of shipping
passed through it in 1902, paying 221,500 marks in dues.
5. Harbour constructions. German seaports are situated for the
most part at the mouths of rivers, in order to render direct communication
possible between river vessels and sea ships; they mostly possess outer
harbours for ships of larger dimensions to disembark their passengers, and
relieve the sea ships wishing to proceed with a portion of their freight to
the chief harbours. Thus Bremerhaven has been built at the mouth of the
Weser in course of time for Bremen, and Cuxhaven at the mouth of the Elbe
for Hamburg. In both harbours there are docks, in which the large American
fast steamers can moor directly at the side of the wharfs. Similar conditions
have developed in smaller harbours: for instance there is an outer port at
Travemünde for Lübeck, at Warnemünde for Rostock, at Swinemünde for
Stettin, at Neufahrwasser for Danzig, and at Pillau for Kænigsberg.
The chief harbours of Bremen and Hamburg have undergone very great
changes during the last few years, having been converted, increased and
fitted out by Messrs. Franzius and Nehls into "Freihäfen" (free ports) in
1885-1890. At Lübeck and Stettin similar seaports have been constructed and
furnished with every modern method of facilitation for traffic, although on a
much smaller scale.
The inland harbours also, with their increasing traffic and ever rising
importance for inland shipping traffic, have developed, in the free competition
of individual centres of trade and industry, into model and well appointed
centres of commerce. Of special importance in this respect are Cologne,
Mayence, Mannheim, Frankfort-on-the-Main, Duisburg, Düsseldorf, Ruhrort,
Dortmund, Dresden, Strassburg and Magdeburg.

The following tables will show the importance of such navigation works for goods traffic, and how they are being turned to account to an increasing extent.

l. German inland harbours.

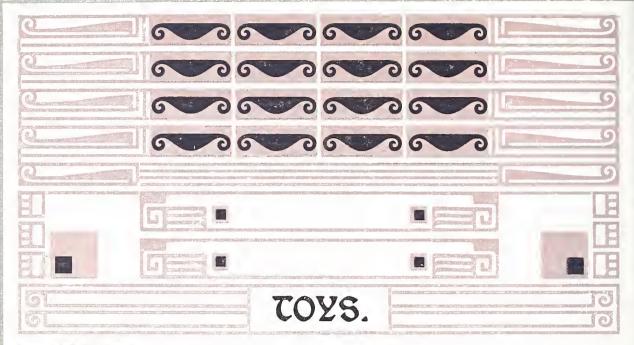
		Goods traffic in tons in										
	1880	1890	1896	1898	1900	1902						
Mannheim Ludwigshaven Cologne	214,367 131,412	815,500 523,600 241,011 2,728,618	4,182,482 1,093,597 — 4,092,096 5,592,221	4,508,271 1,324,497 895,427 600,036 5,596,971 5,791,296								
Frankfort-on-the- Main	1884 152,425 1880	1887 360,062 1885	1,024,161 1890	— 1896	1,112,030	1,034,033						
Dresden Magdeburg	212,900 1,031,071	479,272 1,091,983		767,382 1,764,932	 1,994,717	_						
Berlin (without suburbs)	1870 2,365,015 1880	1880 4,280,271 1890	5,404,104 1895	1898 5,632,398	5,455,539	5,953,908						
Breslau	125,355	1,219,849	1,409,731	2,018,857	_							

Il. German sea ports.

	Goods traffic in tons in										
	1875	1880	1885	1890	1895	1898					
Kænigs-											
berg	785,637	648,957	936,952	899,573	1,064,128	1,171,117					
Danzig	821,788	926,349	1,018,113	939,932	1,195,148	1,442,231					
Luebeck	825,525	1,065,405	1,137,661	1,482,464	1,517,878	1,762,303					
Stettin	_	1,338,874	1,555,097	2,042,937	2,431,027	3,178,717					
Bremen	1,040,179	1,597,459	1,599,120	2,265,388	2,968,746	3,624,388					
Hamburg .	2,720,966	4,121,789	5,075,237	7,519,296	9,346,901	12,258,922					
						(1897)					

Karl Bernhard.







ermany has two towns—Nuremberg and Sonneberg—which form centres of the toy industry. They have become famed not only for their historical development, but chiefly on account of their great productivity, and of the important part they play in the commerce of the world. In olden times the collective name of "Nuremberg toys" owed its origin to the

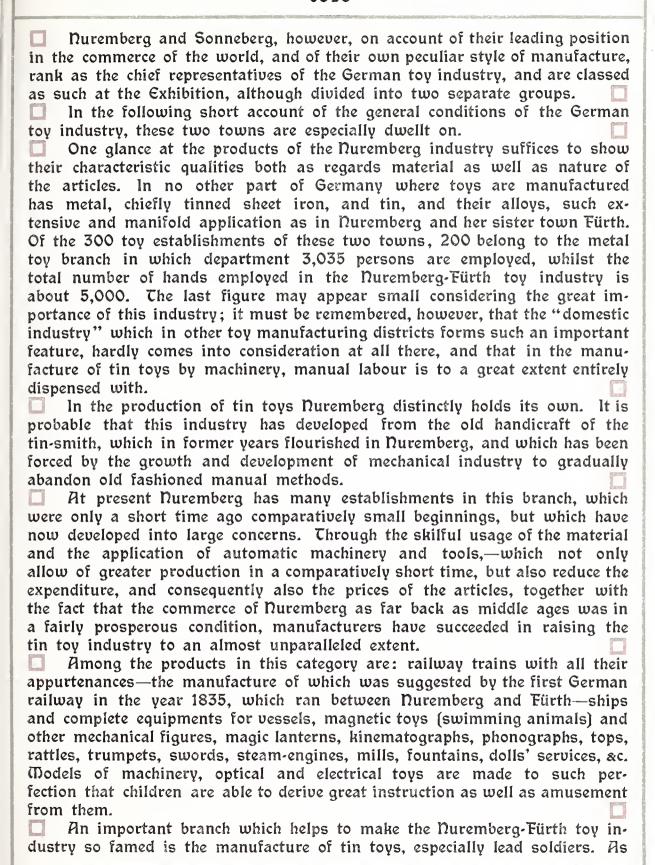
fact that in the middle ages till the 18th century Nuremberg was the great commercial trading place for toys of all kinds.

Long before Nuremberg had any toy factories of its own, its merchants travelled to the most distant parts of the globe with the products of the mountainous districts of Bavaria, Thuringia, Saxony and of other parts of Germany, and this gave rise to the old saying: "Nuremberg toys all the world enjoys." After a time, however, Nuremberg was successful in becoming world-famed for its own products and in developing like Sonneberg—the seat of the Thuringian toy manufacture—into one of the principal centres of the German toy industry.

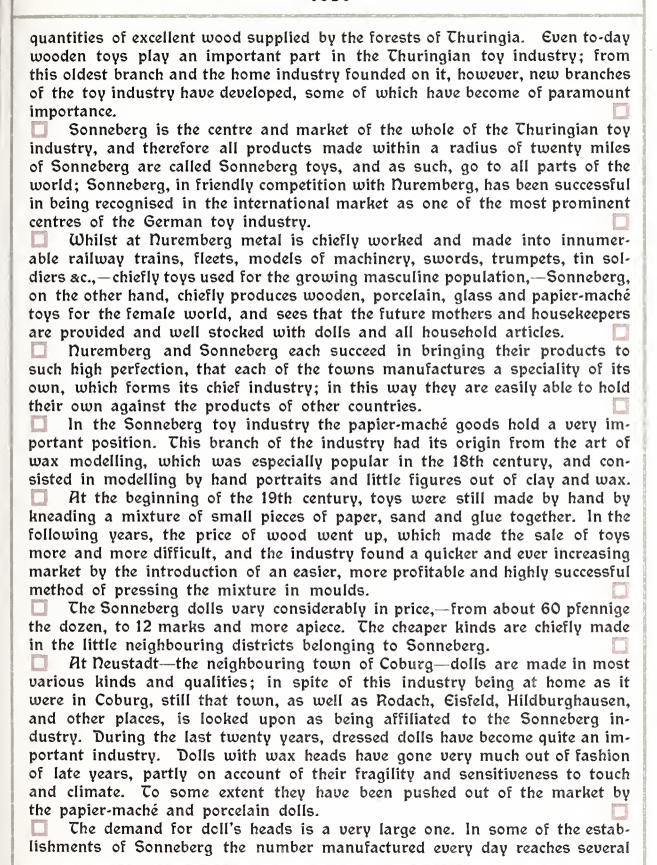
In order to complete the list of the German toy manufacturing towns several other places must be mentioned, in some of which the industry has been carried on for many years, and others where it has only begun of late

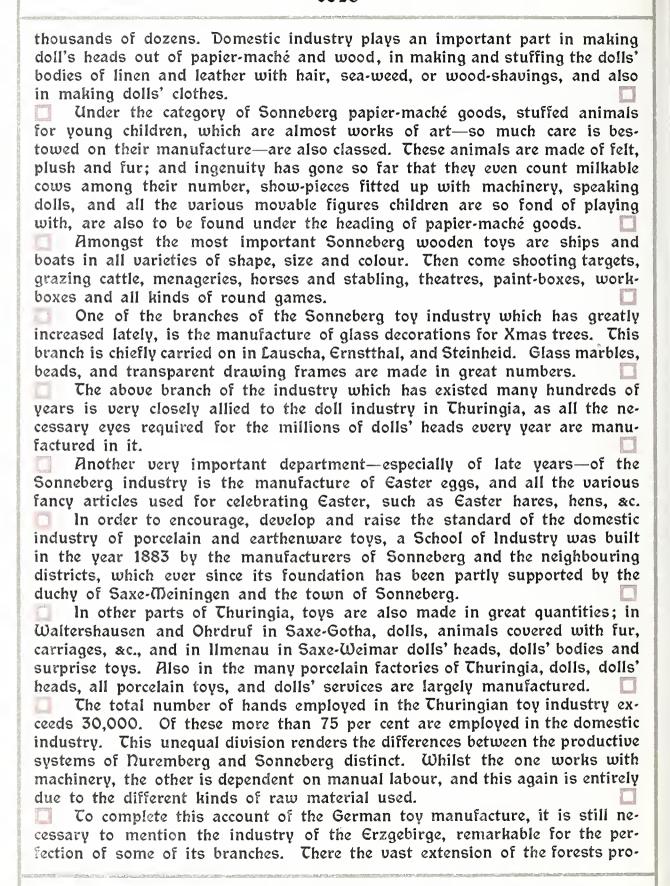
years to develope.

One of the most noteworthy of these is the town of Fürth in Bavaria, where toys are manufactured greatly resembling those of Nuremberg. In the Kingdom of Saxony the towns of Dresden and Zwickau with their surrounding suburbs especially deserve attention on account of their extensively developed wooden toy industry; among the other Confederate States (Alsace-Lorraine has almost no toy industry) only the duchy of Saxe-Coburg-Gotha, with its rich production of china and papier maché toys, is prominent.



long ago as the 18th century, figures were made out of an alloy of tin and lead, and were sent to all parts of the world by Nuremberg merchants. The figures made by a certain Christian Hilpert of Nuremberg, who died in 1792, were highly valued. At present, millions of tin soldiers representing the armies of every country are manufactured every year and sent to the market. The figures are cast in moulds of slate which have been fashioned from drawings of artists; for the so-called full figures the mould is generally cut in metal according to a plastic model. Other tin toys, made in a similar manner, representing dolls' furniture, chandeliers, candlesticks, kitchen utensils, frames, &c. and even altar decorations of every kind, are also very popular amongst children. At Fürth the manufacture of tin toys as articles of commerce began to develop in the middle of the 18th century. At present there are 20 establishments at Nuremberg and Fürth emoplying about 150 hands, though three and four times as many people are engaged in their own homes (so-called "domestic industry") in painting the tin figures. These are made in every kind and quality, and the prices differ accordingly; for example, for five marks, a gross of boxes, each box containing 800 soldiers, can be obtained, whereas some other figures cost as much as five marks each. Boxes containing whole camps, artillery parks, regiments with their officers, men, band, buglers and even the smallest detail are supplied. Nuremberg and Fürth send tin toys to the value of about a million marks annually to the market, two-thirds of which are exported to other countries. Nuremberg has 44, and Fürth 8 establishments for the manufacture of wooden, horn, and such like toys. These manufacture magic boxes, croquetgames, all turned goods, work boxes, dolls' houses, stables, shops, fortresses, wooden snakes, games of lotto, tivoli, draughts and dominoes, &c. Ordinary wooden toys such as fanciful little houses, dolls' beds, &c., are sold by the dozen for a few pfennige, and are made at Oberammergau and Berchtesgaden in Bavaria, where the large forests enable wood to be obtained very cheaply. In the mountain districts of the Rhon wooden toys are also made. and consist chiefly of animals, carriages and carts of all kinds; they are principally sent to the Nuremberg and Fürth markets. For the manufacture of all card-board and paste-board toys, such as bandboxes, scrap books, transfer pictures and theatres, Nuremberg and Fürth have 23 establishments. The transfer pictures have an especially large trade, for they are not only used for decorating all sorts of toys, such as wooden boxes. dolls' furniture, botanical boxes, &c., but they are sold in many thousands of little books every year for the amusement of children. The older articles of the Nuremberg toy industry,—children's whips and counters—are also of great importance, the latter, made in metal, being called "Dantes"; these latter are exported in large quantities to the east. Widely different to the Nuremberg toy industry is that of Sonneberg in Saxe-Meiningen. The Sonneberg toy industry looks back upon a history of many hundreds of years, and owes its origin and continuity to the large





DECAL HARDWARE

vides the home industry with the necessary raw material for wooden toys. The principal seats of the industry are Olbernhau, Grünhainichen and Waldkirchen, where the wholesale merchants of the goods manufactured in the neighbourhood reside. Certain specialities are made exclusively in certain villages; thus, for instance, the hamlet of Seifen produces little animals by the radial splitting up of wooden rings, turned on lathes in such a manner, that each section represents the outline of an animal, only requiring a few finishing touches from the carver. This clever process of production on a large scale explains the extraordinary cheapness of these goods.

Seifen is the oldest seat of the toy industry of the Erzgebirge; at the end of the 18th century Grünhainichen and Olbernhau joined in, and the importance of the whole district recovered to

portance of the whole district rose rapidly.

The total output of German toys represents a value of from 50 to 60 million marks, of which three-fourths are exported. The lion's share in the production is contributed by the towns of Nuremberg and Sonneberg, which supply about 90 per cent of all toys manufactured.

The von Kramer.





Il sorts of hardware, of the most various kinds of metal, from the most beautiful objects of art down to the cheapest articles in everyday use, are manufactured in Germany, and form one of the chief branches of German trade.

After classifying the materials, German industrial statistics concerning metal work (group V) can be divided into

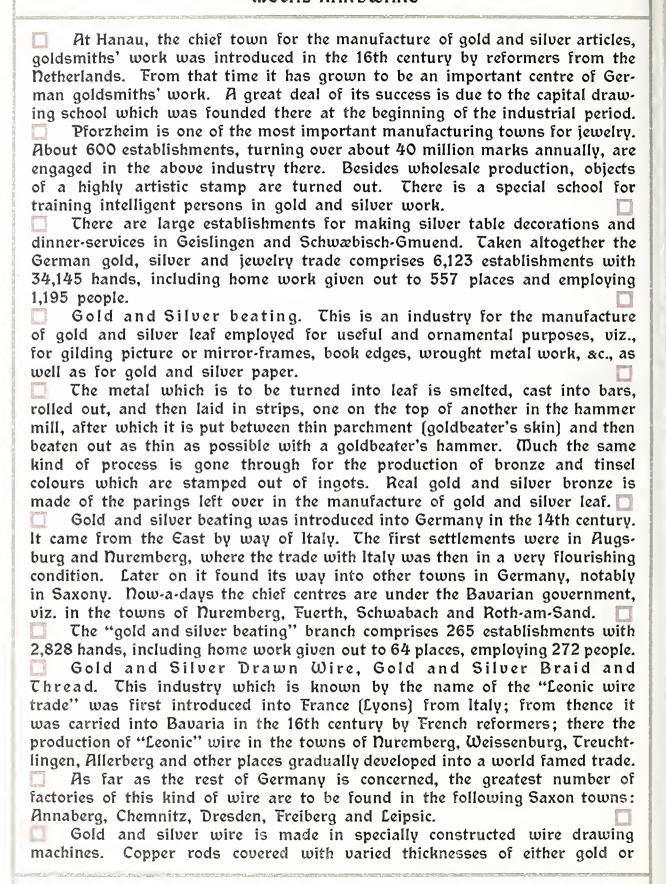
three principal divisions, with 34 sub-divisions.

The following statistics are arranged on the above basis.

A. Precious Metals. Gold, Silver and Jewelry. The best workmanship in fine gold and silver is to be found in places where the fine arts are cultivated, and

where the works of artists have an opportunity of really influencing the taste and ingenuity of workmen. The museums and art-schools which exist in all the larger towns, possess samples of work done at various times in different countries, and are important factors in the development of the highest class of industrial art.

WELAT HARDMAKE



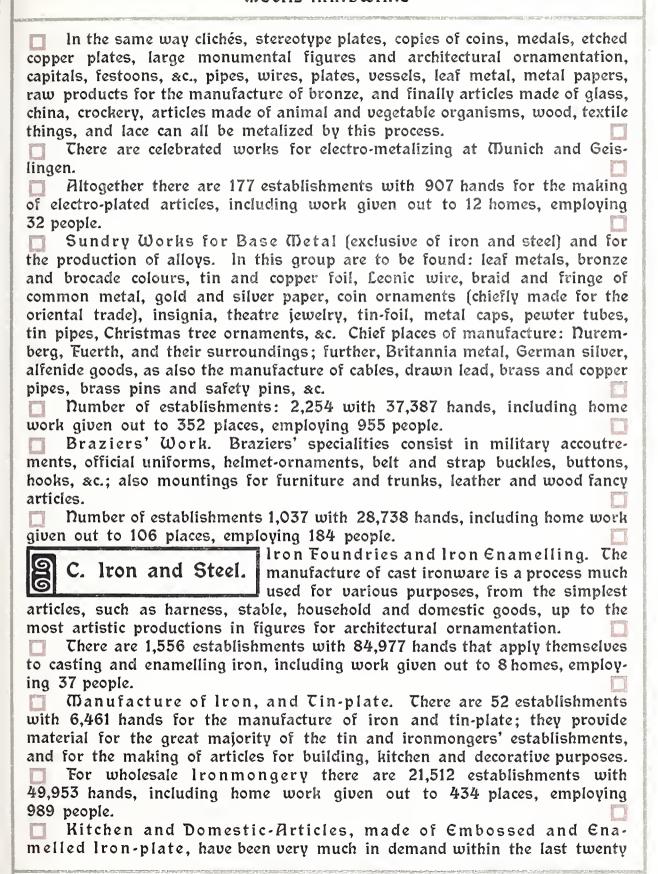
METAL HARDWARE

silver are drawn through cone-shaped holes in draw-plates made of the best
and hardest steel; the perforations grow gradually smaller in size until the wire has the requisite thinness, the very finest sorts being drawn though
drilled diamonds. Most of the factories for gold and silver wire also make
gold and silver braid, lace, fringe, and everything used in the decoration of
costumes, uniforms, ecclesiastical vestments, &c.
For the manufacture of gold and silver wire, braid, and thread, there
are 455 establishments with 3,598 hands, including home work given out to 356 places and employing 223 people.
Mints and Stamping Works. The coining of German gold and
silver money is carried on at the State Mints of Berlin, Munich, Dresden,
Stuttgart and Carlsruhe.
There are a few establishments for stamping medals, commemorative
coins, &c. in sterling and base metals; the best known are in Berlin, Magde-
burg, Dresden, Nuremberg, Stuttgart, Frankfort-on-the-Main and Pforzheim. In addition to the State mints, the coining and stamping establishments
number 16 with 365 hands, including work done at home by one person.
Coppersmiths' Work. The general remarks upon
B. Base Metals gold and silver work given above likewise apply (exclusive of Iron and Steel). At the present day much is done for the satisfactory production of ornamental and useful articles.
6 (exclusive to coppersmiths' work of an industrial-art nature.
of Iron and Steel). At the present day much is done for the satis-
factory production of ornamental and useful articles made of chased or embossed copper, such as vases, flower pots, wine-coolers,
bowls, &c. Berlin and Munich are at the head of this trade, and are followed
by Dresden, Carlsruhe, Nuremberg and Stuttgart.
Copper articles of a purely industrial nature are being ousted out of the
market by the growing taste for enamelled or lacquered sheet iron utensils.
There are 3,504 establishments for this industry with 10,596 hands, including home work given in 36 cases and occupying 105 people.
Copper and Brass Foundries, Ore and Bell Foundries. Under
this heading we find armatures, taps and valves for machinery, pumps, gas
and water work fittings, lamps, candlesticks, &c., finer sorts of cast bronze
work, door handles, fittings, mountings, bells, &c.
The manufacture of these articles is carried on in several large towns
in 1,031 establishments with 5,188 hands, including home work given out to
46 places and employing 167 people. The Pewter Industry generally includes the making of useful articles
for domestic use, especially drinking mugs made entirely of the metal, though
it is often only employed for the lids. Berlin, Munich, Nuremberg and Nab-
burg are the chief towns for the manufacture of the finer sorts of pewter articles,
such as dinner-services, &c. In this branch there are 1,032 establishments with
2,351 hands, including work given out to 32 places and employing 83 people. Oetal Toys. This is a very flourishing trade, and is a speciality of
Nuremberg and Fuerth. Further information on this subject is to be found
in the introduction to the group "Toys"

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Number of establishments 244, employing 2,832 hands, home work in 86 places, employing 255 people.
Small Shot, and Bullet Factories. The chief places for this industry
are Aix-la-Chapelle, Berlin, Neuss, Stolberg, and Durlach. The establishments
number 15 with 285 hands, home work 1, employing 3 persons. Under the
heading "Sundry Articles of Manufacture in Lead and Pewter,"
the German Industrial Statistic Office mentions 254 establishments with
2167 hands, including home work to 125 places, employing 149 people.
Zinc Foundries, and Zinc Ware Manufacturies. Zinc casting is
largely employed in the making of works of art, such as bronze figures, can-
dellabra, lampholders, &c. it is also much used in architecture as cast and
sheet zinc. The number of establishments 139 with 2,290 hands; home work
given out to 2 places, employing 7 persons.
Manufacture of Aluminium Goods. Aluminium, which has been
made so much use of within the last ten years, was first manufactured in
1827 by Prof. Wöhler at Gættingen; the process was so improved by Deville of Paris in 1854, that large quantities could be turned out. The wholesale pro-
duction of the substance dates, however, from 1888, when electricity was first
used for eliminating the metal from its oxyde. Aluminium can be cast at
700° Celsius, and all sorts of objects are made of it for technical as well as
scientific use. Raw aluminium is used for making dense cast iron, and as
an alloy, especially in combination with copper in sheet form; it has of late
been combined with other metals, particularly copper and iron, and rolled out
as a bi-metallic sheet.
Sheet aluminium is used for many things, door and window fittings,
furniture mountings, caskets, cylinders, cups, mugs, hinges, screws, build-
ing decorations, kitchen utensils, hunting flasks, scientific and musical
instruments, &c. Aluminium has likewise been beaten out to leaf, and threat-
ens to replace silver leaf; the same applies to aluminium-bronze dust
obtained from the crushing of compact aluminium, which is often used as a
substitute for real silver and pewter bronze. Aluminium wire is frequently employed instead of silver.
There are 27 establishments with 1,481 hands occupied in this trade,
including home work given out to 5 places, employing 15 people.
Manufacture of Electro-plated Articles. By obtaining a metal
deposit with the help of galvanism, a metal precipitate can be procured in a
mould taken of an object, which after the mould (technically called a "matrice")
has been removed, gives a lasting and exact copy of the article in question.
Besides this, a slight metal covering can be given to any moulded figure; for
instance, an embossed or cast copper mug can be provided with a coating of
either gold or silver. The inventor of electro-plating was Moritz Hermann
Jakobi, who was born at Potsdam in 1801, and died there in 1874. In 1839
he succeeded in obtaining galvanoplastic reproductions, but only from metal
matrices; now-a-days they can be obtained from almost any kind of material

DETAL HARDWARE



METAL HARDWARE

years, and are preferred to ordinary black goods on account of their pleasing
appearance.
The Manufacture of Lacquered Tin has also very much increased,
especially in Nuremberg where large quantities are made.
For this ware, there are 1,384 establishments in Germany, with 31,238
hands, including home work given out to 81 places, employing 232 people.
The Nailsmiths' Trade has declined very considerably since the in-
troduction of machine-made nails; there are, however, still 4,267 establish-
ments with 4,837 hands at work, including home work given out to 583 places,
employing 581 people.
The factories for Iron-wire are principally situated in the Rhine Pro-
vinces and Westphalia.
They comprise 171 establishments with 4,099 hands, including home
work given out to 11 places, employing 22 people.
Danufacture of Rivets, Nails, Irons, Screws, Chains, and
Rings. The chief places for the manufacture of these articles are likewise
in the Rhine Provinces and Westphalia, after which come Upper Silesia and
the South German States.
Berlin is one of the most important places for the manufacture of
wood screws; Nuremberg for wire nails; there are 1,417 establishments with
16,936 hands, including home work given out to 688 places, employing
875 people.
The Blacksmiths' Trade is in respect to size the largest among the
metal branches; there are 80,656 establishments with 142,351 hands, including
home work given out to 1,400 places, employing 2,651 people.
This high figure is explained by the circumstance that machinery has
not been able to replace hand work in the blacksmiths' trade, or where it
is the case, only to a very slight degree. The blacksmiths' principal work is
mounting vehicles of all sorts, making horse shoes, and shoeing the animals.
There are numerous schools for training blacksmiths, especially for the
last named branch of the trade, carried on at the cost of the State and the
various communities.
Manufacture of Locks and Safes. The German art-locksmiths' trade
has almost attained perfection within the last few decades. All kinds of
lamps, railings, gateways, staircase balustrades, door and furniture fittings
are made and exported in great quantities.
An important part of the locksmiths' work includes the making of
wrought iron furniture, such as bedsteads, washhand-stands, garden chairs
and tables, &c., and the manufacture of safes and cash boxes.
This metal branch comprises 26,546 establishments with 104,905 hands,
including home work given out to 1,148 places, employing 3,010 people.
[Lightning Conductors are only manufactured by a few firms which
make a speciality of them; there are 83 establishments with 109 workmen in
the trade, which is generally carried on conjointly with that of an ironmonger
or mechanic

Tools, Scythes, and Cutlery. Anvils, windlasses, pulleys, pick-axes, shovels, spades, ploughs, scythes, shears, and all kinds of knives, forks, scissors, cut-and-thrust weapons, irons, &c. come under this heading.

The principal places for this industry are the Rhine Province (Solingen, Barmen, Remscheid), Suhl in Saxony, and Berlin. Number of establishments: 8,915 with 28,752 hands, including home work given out to 2,411 places

employing 4,150 people.

Scissors, Knives, and Tool Grinders. There are about 4,725 establishments for this trade with 7,098 hands, including home work given out

to 563 places, employing 1,018 people.

File cutting. Files were made entirely by hand till quite lately, but in the present day they are forged, ground and cut by machinery. The sharpening of blunt files, as well as the smoothing off of rough turned edges in new files is done with the help of the sand-blast.

There are 2,728 establishments for file making with 8,340 hands, including home work given out to 1,064 places, employing 1,669 people.

Manufacture of Steel and Iron Hardware. This includes door and furniture locks, hasps, padlocks, hinges and the ornamentation of chased, embossed, or open-work iron plate. Skates have to be reckoned among the steel articles which are mostly manufactured in the Rhine Provinces, then come steel rings for pianos and other musical instruments (Nuremberg), watchsprings, fret-saws (Augsburg), spectacle frames (Fuerth) and lastly cast steel bullets.

Number of establishments: 2,124 with 20,741 hands, including home

work given out to 464 places, employing 949 people.

Sewing and Knitting Needles, Pins and Crochet Hooks are chiefly made in Westphalia, the Rhine Provinces (Aix-la-Chapelle, Iserlohn and Stolberg) and in Bavaria (Schwabach).

There are several thousand millions of these articles made in the course of the year. The establishments number 78 with 4,135 hands, including home

work given out to 9 places, employing 26 people.

Pin and Wire Makers. Iserlohn is the chief place of the manufacture of hair-pins, hooks and eyes, wire-work fencing and wire netting. Nuremberg is also a great place for hooks and eyes.

The establishments in all Germany number 1,447 with 9,031 hands,

including home work given out to 150 places, employing 251 people.

Steel Pens are manufactured in great quantities in Berlin and Leipsic-Plagwitz, and penholders at Bonn, in 6 establishments with 744 hands, including home work for 1 place, employing 2 people.

Altogether for the manufacture of metal hardware, there are: 174,240 establishments with 639,755 hands, including home work given out to 10,795 places, employing 20,105 people, 18,661 males and 1,444 females.

This total is divided into three principal groups:

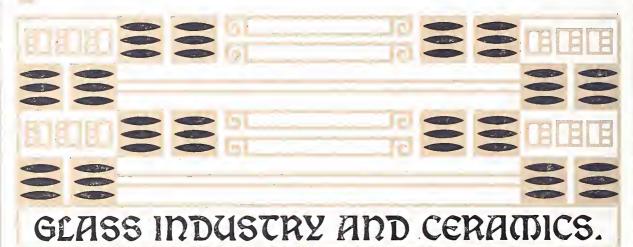
A. Precious Metals. 6,859 establishments with 40,836 hands, including home work given out to 978 places, employing 1,691 people.

B. Base Metals. 9,714 establishments with 74,212 hands, including home work given out to 802 places, employing 1,952 people.

C. Iron and Steel. 157,667 establishments with 524,707 hands, including home work given out to 9,015 places, employing 16,462 people.

The average annual export of German metal hardware amounted in the last five years to 150,000 tons, with an average annual value in round figures of 40 million marks.

Th. von Kramer.





he manufacture of glass and of ceramic products is based on a common foundation, for they both result from the practical working up of silicates or derivatives of silicic acid. But whilst the glass industry produces fusible silicates, which can be formed, when in a liquid state, into all kinds of useful articles, the ceramic art industry employs

infusible silicates of argillaceous earth, the so-called clays which occur in nature, as its raw material, they having, when in a damp condition, plastic properties, and being able to retain the shape imparted to them when subjected to subsequent drying and heating processes. Thus, although the methods of work in the two industries are totally different, they have several points in common, for they are both of extreme antiquity and based on purely empiric foundations which have only quite recently been elucidated by science, and they are both extremely capable of lending themselves to artistic purposes; they must therefore be regarded from an artistic point of view as well as from a purely technical one. The former standpoint is discussed in the preface to "Art Industry," whereas in the present article it is proposed to review them from chemical and technical standpoints.



l. The Glass Industry.

It is probable that glass making was first introduced into Germany by the Romans, but it is a noteworthy fact that in the very beginning the German glass industry distinguished itself by a brilliant invention, con-

sidering the period in which it was made. It is a well known fact that the

Romans used natural soda imported from Egypt as the alkali indispensable to glass making. As the old German glass workers could only obtain this with difficulty, they replaced it by potash extracted from the charcoal of the wood they used. The other raw material necessary for glass making, sand, is found in many parts of Germany, and thus the new industry was, from the outset, only dependent on its own country for raw materials, and it is to this fact that the rapid and constant growth of the industry is due. The early development of the mining industry in Germany supplied the glass maker with many oxides suitable for the production of coloured glass, and the good use to which the old practitioners put this commodity may be still seen and admired in the beautiful medieval stained glass windows of old German churches. In the 19th century science concerned itself with the glass industry as well as with many other old trades, and thus prepared them for new progress and development. The fundamental work of Schwarz demonstrated the principle underlying the extremely varying chemical composition of different glasses, and created a sound basis for the study of the composition of glass. The tedious experiments which in former times so often misled glass makers, disappeared with all their disastrous consequences, and an opportunity was created for the production of durable and resistant glass by methods based on scientific principles. The potash so exclusively used during the middle ages was again partly replaced by soda after the development of the soda industry; and soda in its turn had, at any rate in cheap glass, to make room for sulphates. This cheap raw material, however, required greater heat for melting down than could be obtained in the furnaces of the old glass makers. There was yet another reason why these furnaces had to be abandoned: they were only suitable for wood as fuel, and the vast forests which had once covered almost the whole of Germany had gradually disappeared. The difficulties which arose from this state of things were most happily overcome by the invention of the regenerative gas heating system by Friedrich Siemens. This brilliant progress not only permitted temperatures to be obtained which could not otherwise be reached by the old furnaces, but poor fuel such as inferior lignite coal could be used, which made it possible to introduce the glass industry as a remunerative occupation in districts where it had previously not been able to exist. In its ultimate development the regenerative gas heating system transformed glass making from an intermittent process into a continuous one. This progress which, it is true, is only of advantage to those factories which produce vast quantities of cheap glass (such as bottle and window glass works), was realised by the invention of the vat furnace. Under such circumstances it is not surprising that regenerative gas heating, which had already caused great revolutions in many other branches of industry, was most rapidly adopted, and reached the highest state of perfection in the glass industry.

engineers, some of which have found lasting favour.

Siemens' original constructions have been supplemented by those of other

The great importance of the gas heating system to the glass industry gives rise to the question, how many glass works have adopted the gas furnace? There are no official statistics on this subject, but the author of this article has attempted to find an answer by private investigations made in 1893 and 1898, which have furnished the following data:

In 1893, 312 glass works possessed a total of 255 gas furnaces. In 1898, 324 glass works had 320 gas furnaces in operation, a result which shews a marked progress of the gas system during the intervening five years. Of the 320 furnaces, 187 were constructed according to the Siemens' system, and 53 glass works were worked with vat furnaces of different construction.

The most important raw material for making glass, white quartz sand, is found in many places and in large quantities in Germany. It is of great importance that the sand should be free from iron oxide, as colourless glass can only be obtained under such conditions, the smallest trace of iron producing a greenish tinge. The occurrence of very pure sand in the neighbourhood of Aix-la-Chapelle, in the Lausitz, and Silesia has been the cause of an important glass industry springing up in those parts.

The necessary alkali salts are supplied to the glass industry by chemical works. A third ingredient of ordinary glass to be considered is limestone, which is to be had everywhere in a sufficiently pure state. For crystal glass, limestone is replaced by lead oxide or minium. Glass which contains both lime and oxide of lead is called half-crystal, and its production has increased of late, it being chiefly used for pressed glass articles.

The bottle glass industry, the products of which contain a good deal of iron and are consequently dark in colour, is dependent upon very cheap raw material which leads to the use of compound minerals such as granite and trachyte in the composition of bottle glass.

Coloured glass is obtained by the addition of various metallic oxides and other materials. There are but few factories in Germany which produce coloured glass, but their work is excellent although even in Germany it is not appreciated to the extent that it deserves to be. Chemicals which produce colour in glass have also some importance for the manufacture of white glass, as they are added in order to hide the greenish tinge resulting from the slightest traces of iron. Manganese peroxide, which was formerly exclusively used for this purpose, has of late been replaced with great success by small quantities of selenium and of didymium oxide.

The shaping of blown glass is still done by the old means of the pipe, and though many attempts have been made to introduce mechanical blowing apparatuses, they have led to no practical results. Great hopes are entertained for Sievert's new shaping process, which consists in pouring liquid glass upon perforated metal plates and subsequently tilting the latter. The glass sinking down by its own weight sucks in air through the metal plate, and the process is helped by compressed air being blown into the perforations. This process permits of the production of glass vessels of enormous sizes formerly unattainable; a modification of the process consists of pouring liquid

glass upon damp asbestos, the sudden generation of steam serving to blow the glass into a metal form placed over it.

The sheet glass industry utilises the well known process of cutting open a cylindrical vessel of large dimensions and flattening it out in a stretching oven. This industry is highly developed on the banks of the Rhine, in Saxony, Silesia, and the Lausitz. Some factories in Bavaria still produce very thick

sheet glass which is finished by grinding and polishing.

The manufacture of real plate glass of large dimensions consists of pouring liquid glass upon metal tables and flattening it by rollers. The glass sheets thus obtained are finished by mechanical grinding and polishing. The two largest plate glass factories in Germany are at Stolberg near Aix-la-Chapelle and Waldhof near Mannheim, both belonging to a French company.

The industry of pressed glass stands in the same relation to the production of blown hollow glass, as the plate glass industry to the manufacture of sheet glass. American influence is traceable in the development of this process, which has obtained a good footing in Germany, and is carried on as a supplementary occupation by many glass works. For pressed glass the introduction of regenerative gas heating has been of vital importance, as only by its help can glass be obtained in a sufficiently liquid and clarified condition.

The crystal and half-crystal glass industry is less highly developed in Germany than might be expected, although it is true that there are a few very important works of the kind. Of these the largest is in Lorraine, where it was established more than 100 years ago by a French company. A few other factories on the Saar and the Moselle are likewise of French origin. A large factory in the neighbourhood of Cologne and the well known Josephinen-Hütte in Silesia are probably the only large crystal glass works which owe their existence to German enterprise. Of late, art objects consisting of coloured crystal glass in many layers, elaborately ground and engraved, have come into fashion, and have shown once more that it is impossible always to replace real lead crystal by half-crystal.

Glasses especially manufactured for scientific purposes are not produced in such large quantities as those hitherto mentioned, but they are particularly interesting on account of the extraordinary progress made in Germany in their production during the last twenty years. Two kinds of these glasses have to be considered, optical glasses, and glasses for chemical and physical use. The manufacture of the former began in Germany more than a century ago, and Fraunhofer's work on this subject secured for them at once a good reputation. Their production was small, and large quantities of both crown and flint glass had to be imported from France and England. In the beginning of the eighties Prof. Abbe of Jena showed that further progress in the construction of optical instruments was only possible if a greater variety of optical glass were placed at the disposal of the working optician. Together with Dr. Schott, and supported by the Prussian Government, he started ex-

perimental works at Jena with the object of preparing glasses of varied composition and of examining their physical constants. Immediate success crowned these endeavours and to such an extent that very soon the experimental works became a large factory, which at present supplies almost the whole world with glass for fine optical instruments. Countless experiments have led to the definite adoption of a number of glasses which possess optical constants totally different from the old crown and flint. Baryta enters largely into the composition of these glasses. Schott's glass works did not, however, confine their efforts to optical glass, but tried with equal success to improve the glass necessary for the manufacture of physical and chemical apparatuses.

The first problem to be solved here was the production of glass free from the troublesome fault of thermometric depression. Various compositions have been found to answer this purpose; a glass which is free from depression and yet very resistant to chemical attacks is the so-called "Geräte" glass, and the latest novelty—"Borosilicate" glass—has the additional advantage of a very high melting point. It must be mentioned that Schott's invaluable work has been to some extent supplemented by the Imperial Physical Institute of Berlin. Undoubtedly it had a very beneficial influence on the whole of the German glass industry. A great improvement is noticeable in all glass intended for chemical purposes, and the fact that baryta and boric acid are frequently met with in new glasses shows that factories which were formerly content to work according to the old rule of thumb have now called in science to their aid for the improvement of their products.

As an appendix to optical glasses, a peculiar industry may be mentioned which works for the wholesale market. It is the industry of watch and spectacle glasses, the output of which is so large that the greater part of it has to be sold in foreign markets. These glasses are partly cut out of large balloons, a process which reduces the necessary grinding and polishing to a minimum. The greater number of the factories concerned are situated in Lorraine and the Bavarian Palatinate.

The importance and variety of the German Glass Industry is best shown by the following statistical data:

A.	P	r	0	d	u	c	t	î	0	n.

	Quantity in tons	Value in marks	
1. Hollow glass	133,272 58,835 13,774 78,487 39,547 991	42,310,000 29,675,000 10,285,000 17,502,000 14,686,000 757,000	
		115,215,000	

B. Impor	tand	€хр	ort.
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	Common green glass				Fine white hollow glass			Window and plate glass			Watch and spectacle glass		
	1894	1898	1902	1894	1898	1902	1894	1898	1902	1894	1898	1902	
Value*) of import Value of export		0,1 9,9	0,1 11,9	0,1 5,5	0,2 6,0	0,5 7,1	0,4 3,2	0,4 3,2	0,6 8,0	0,2 2,7	0,5 3,1	0,4 3,9	

The ceramic industry, which in the widest sense of the Il. Ceramics. | word also embraces brickmaking, is to be found in every part of the German Empire, where it has existed since

time immemorial. It is dependent even more than the glass industry on local conditions; its development has consequently been different in various parts of the Empire. Modern means of locomotion have rendered this industry more independent, yet the fact remains that the occurrence of large beds of clays of peculiar properties invariably gives rise to the formation of a dense group of factories of a decided character.

Common clays, which contain a large percentage of iron oxide and very often also of lime, are not very resistant to fire, and are generally utilised for brickmaking and the production of common pottery. Their occurrence is very frequent. The better classes of clay, especially those which turn white after burning, are greatly appreciated, and are frequently found. They are worked up with great care for a better class of goods. Highly refractory clays are somewhat rare, but Germany can boast of some deposits of these in Silesia, in Hesse, and on the Rhine, which are of extraordinary magnitude, and serve for the production of refractory bricks and goods for industrial purposes. Peculiar kinds of refractory clays which at the same time are very plastic are met with in stone-ware clays. Owing to a certain amount of felspar which they contain, they are capable of producing a dense nonporous substance when subjected to a very high temperature. Most of these clays turn gray or brown on being burnt, and have been used for centuries in the production of stone-ware covered with a salt glaze and embellished with blue ornaments by means of cobalt oxide. Stone-ware, the production of which formed an excellent school for the subsequent invention of porcelain, has assumed a great importance in our times, being very suitable for the construction of large and highly resistant vessels and apparatuses for chemical and other industries. The manufacture of floor tiles of great hardness and impermeability is also dependent on the use of stone-ware clavs.

The purest and most refractory clays are called Kaolines, large deposits of which are found in the kingdom of Saxony, in the neighbourhood of Halle, near Passau in Bavaria, and in Silesia. They were not utilised in former times, and have only obtained their present importance through the invention of the manufacture of porcelain, which as everybody knows was introduced in 1709 by the alchemist Böttger. The German Kaolines cannot be used in their crude

^{*)} In millions of marks: amounts under 100,000 marks are not included.

state for the manufacture of porcelain, but have to be mixed with felspar which is generally imported from Norway and Sweden. Quartz is also added sometimes, though the Kaolines contain parts of it in their original state. In consequence of the addition of felspar, porcelain enters into partial fusion when being heated and loses its porosity. It is well known that the burning of porcelain is accomplished in two separate operations, and that a mild heat is given in the first, whilst the highest temperature attainable is necessary in the second. Between the first and second heatings the article is dipped into glaze, which in its composition is similar to porcelain itself but more fusible. Porcelain is very often decorated by rich painting and coloured glazes, and it is certainly the most exquisite material for all artistic endeavours in connection with pottery. The painting of porcelain can be done either under or over the glaze; in the former case the colours must be able to resist the high temperatures at which the porcelain is burnt. Colours painted on the glaze can be burned in at the temperature best suited to them in muffle furnaces.

The necessity of mixing various materials for obtaining proper porcelain masses has led to the application of clay mixtures in other domains of the ceramic art. The preparation of such mixtures has been made easy and reliable by Seeger's important investigations concerning the influence of the various constituents of clay on the formation of the ceramic object. Seeger's "rational analysis of clays" enables a better idea of the nature of a clay to be obtained, and allows the features lacking in clay required for a special purpose to be ascertained. Clay mixtures or "artificial compositions" are therefore largely used now-a-days in all the various branches of pottery.

There is no industry in which "artificial compositions" are more important than in the manufacture of the better classes of earthenware, which were originally introduced from England. They produce ware of a white or light coloured porous body from a mass composed of white plastic clay, felspar and ground flint, which is covered with a transparent plumbiferous glaze. As the heat of the earthenware furnace is much lower than that of the porcelain furnace, earthenware may be decorated with a large variety of under-glaze colours, which are generally applied by mechanical processes. Though the products of the earthenware industry cannot compare with porcelain either in durability or in the good taste of their decoration, yet they go a long way in supplying the wholesale market.

Clays which do not turn quite white on being burnt form the material for the many varieties of common earthenware and majolica, the glaze of which always contains lead and sometimes tin. Common earthenware is manufactured in a great many places in Germany, but mostly in small establishments which have recently met with a great deal of encouragement from artists' circles.

The manufacture of white earthenware is generally carried on in large factories, some of which, and notably those of Saargemuend, Dresden and

Schramberg, have developed to an extraordinary size, and give occupation to thousands of workmen.

Stoneware, especially that for chemical use, is manufactured at Charlottenburg near Berlin, Krauschwitz in Silesia, Zwickau in Saxony and in various places in Baden, Hesse and on the Rhine. A good many factories are occupied with the production of stoneware pipes. A special kind of stoneware which is remarkable for its light colour, and therefore capable of coloured decoration is manufactured in the famous works of Messrs. Villeroy & Boch at Mettlach-on-the-Saar, and used both for vessels and for very pretty and extremely durable tiles. The latter are shaped in a dry state by powerful presses; similar tiles are also manufactured in other parts of Germany, for instance in the neighbourhood of Dresden.

A peculiar ware, similar to stoneware, only slightly porous and covered with a brown and white glaze prepared from mixtures of clays, is the so-called "Bunzlauer Geschirr," which is manufactured at Bunzlau in Silesia from clays in the neighbourhood. This ware is well known for its durability, and enjoys a ready sale in all Germany.

The manufacture of porcelain is without any doubt that branch of the ceramic industry which has reached the highest perfection in Germany. It is true that amongst the many porcelain factories of Germany there are some which have only developed the technical part of their industry, and, working for wholesale exportation only, leave much to be desired from an artistic point of view; on the other hand, however, there are many that have cultivated both directions, and justly enjoy universal fame. Of these the two Royal Works of Meissen and Berlin are in the first rank.

The Royal Saxon Porcelain Factory at Weissen is, as everyone knows, the oldest porcelain works of Europe, and is still the largest. In its products it justly clings to the old traditions of the rococo period from which it dates its fame. Yet it is always open to modern artistic ideas; in its technical development it is unsurpassed. The purity of its porcelain and the gloss of its glaze are too well known to be specially insisted upon here. No other factory has such a variety of under-glaze colours, and no less admirable is its dexterous management of the difficult technique of pâte-sur-pâte.

The Royal Prussian Porcelain Works at Berlin have gone through a peculiar development; they were founded in 1750 as a private enterprise, bought up by Frederic the Great in 1763, and have been managed since then by the Prussian Government according to varying principles. At present they are supposed to be in a large measure instrumental in stimulating the ceramic art in Prussia. Large sums are devoted to the solutions of problems of the ceramic art, and not so much attention is devoted to the culture of old traditions as to the creation of new achievements. We cannot here go into the discussion of the very original and remarkable artistic productions of the Royal works, but we will enumerate a few of their technical achievements. We may draw attention to the fact that objects of an extraordinary size, such as baths, have been produced in the works. The introduction of

peculiar coloured and flowing glazes must be mentioned here, as well as glazes which contain well developed glistening crystals. Of no small importance are also the experiments of the factory in the domain of the production of new porcelain compositions which may be burned at low temperatures, and consequently allow of a greater abundancy of under-glaze colours than ordinary porcelain. These products, known under the name of Berlin soft porcelain, possess an agreeable milk white colour, and are totally different in their composition from the phosphate or bone porcelain so largely manufactured in England.

Of the private porcelain factories, many are distinguished by a combination of exquisite technical skill with refinement of artistic treatment.

A peculiar branch of the porcelain industry, represented by a number of factories, devotes its attention to the manufacture of goods for chemical and technical use. In this branch the Royal Porcelain Works at Berlin take a prominent position, producing apparatuses of the greatest resistance to high temperatures and chemical attacks, and solving successfully the most difficult problems as far as complicated shapes and sizes of objects are concerned. Special methods are used for the wholesale production of telegraphic isolators and small parts of electric apparatuses which have to be very exact and uniform in shape. Besides the Royal Works, the firm of Messrs. Schomburg in Berlin, whose works are very extensive, must be mentioned here.

The foregoing sketch cannot claim to be complete, but it may be supplemented by a few statistical data.

According to the statements of the Potters' Trade Association there were in Germany in the year 1898 a total number of 939 ceramic establishments with 71,883 workmen. This does not include brickmaking works, which form a trade association of their own. In that industry there were 12,567 establishments with altogether 280,702 workmen.

Among the 939 ceramic establishments there were:

187	porcelain works	vith	34,030	hands
43	earthenware factories	**	15,341	**
43	porcelain-painting establishments.	11	872	22
	Kaoline mines			
343	stove works	••	10,083	**
	potteries		1,503	••
	stoneware factories		1,746	**
	tile factories		1,021	44

The largest number of establishments is found in Prussia (499), Bavaria (99), and Saxony (81).

The following statistics give an idea of the importance of the ceramic industry in Germany:

GLASS INDUSTRY AND CERAMICS

A. Production.

The following quantities of various ceramic objects were produced in Germany in 1897:

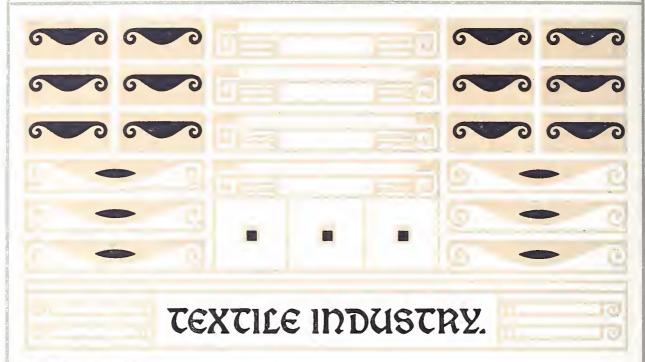
	Quantity in tons	Value in Marks
1. Porcelain goods	78,148	51,257,137
2. Earthenware goods .	66,267	27,345,003
3. Stoneware goods	58,858	3,368,820
4. Tiles	114,377	9,721,087
5. Various		22,085,409
		113,777,456

B. Import and Export.

	€a	rthenw	are	Porcelain, white			Porcelain, painted		
	1894	1898	1902	1894	1898	1902	1894	1898	1902
Value of import in millions of marks Value of export in millions of marks	1·8 6·9	2·1 9·7	1·6 10·6	0.2	0·2 3·4	0·17 4·5	0·6 11·9	1·1 30·3	1·4 47·8

Otto n. Witt.







he textile industry occupies the first place in the list of German trades. It comprises, indeed, a much smaller number of establishments than all other industries, but nevertheless it gives employment to the greatest number of hands, amounting to about one tenth of all those persons industrially active, and also boasts the largest exports and imports. It is especially

noteworthy that this prominent position has been attained in spite of the fact that very few of the raw materials required in its operations are produced in Germany, and that they have therefore to be imported from distant countries at great trouble and expense.

According to the government statistics of 1895 the textile industry of the German Empire embraced 248,617 establishments, of which 162,435 belonged to domestic industry. This latter is characterized by the fact that it is carried on principally at home, and is occupied in executing orders for outside firms. It has obtained footing a principally in the mountainous districts of Silesia, Thuringia, Saxony, Bavaria, &c., but has declined to a considerable extent recently, owing to its inability to compete with large manufactories; the above number must consequently have greatly decreased by now.

The fluctuations in the consumption of textile goods from various causes, and the fact, that in a number of cases workmen without special training can be employed, has led in many instances to the development of the textile trade into a subsidiary one. The existence of a strongly developed domestic industry on the one hand, and the possibility of the production of certain goods without manual assistance or the use of motors on the other hand, leads to the existence of a large number of so-called "single person" establishments, employing no auxiliary aid whatever.

The following summary shows the prevailing proportions:

		The establishments are divided into to							
Total number	principal	sub- sidiary		tablishmen oloying lab			ngle perso tablishmer		
of estab- lish- ments	estab- lish- ments	estab- lish- ments	total	principal estab- lish- ments	sub- sidiary estab- lish- ments	total	principal estab- lish- ments	sub- sidiary estab- lish- ments	
248,617	205,292	43,325	57,792	56,759	1,168	190,690	148,533	42,157	

A glance at the class "principal establishments" makes the following division into small and large establishments possible:

a) Small establishments	1 person 148,53 2 to 5 persons 44,82	establishments
b) Medium establishments c) Large establishments	6 ,, 10 ,, 3,58 11 ,, 50 ,, 5,08 51 ,, 200 ,, 2,42 201 ,, 1,000 ,, 80	6 establishments employing
	Total 205,29	

In 1895 the number of persons employed in the 205,292 principal establishments was 993,257. Of these 532,037 were males and 461,220 females, 148,533 of the total number belonging to "single person" establishments, and 844,724 to establishments employing labour. Consequently the textile industry forms the chief vocation for one person in every 52 of the 52.25 million inhabitants of the German Empire.

A division into owners, staff and workmen results in the following figures:

	Male	Female	Total
Owners of establishments employing no labour		66,654	148,533
Owners of establishments employing labour .	47,714	4,196	51,910
Staff	42,611	1,489	44,100
Workmen	359,833	388,881	748,714
Total	532,037	461,220	993,257

Pl comparison of male and female hands shows that the number of females nearly equals that of the males; amongst the workmen alone the number of females exceeds the number of males employed by 29,000 in round

numbers. Children are largely employed, the percentage being about 8.8 of the total. There are 10,901 apprentices, of whom 8,710 are males and 2,191 females.

In the following table the branches of the textile industry represented in Germany and their extent are shown. The last column of the table stating the number of persons employed refers only to principal establishments.

	Total	Of t	hese	
	number of establish- ments	principal establish- ments	domestic industry establish- ments	Number of persons
a) Preparation of spinning ma-				
terial	1,157	924	113	17,237
1. Silk drying	8	8	1	178
2. Wool preparation	969	834	105	16,358
3. Flax steeping and scutching	180	82	7	701
b) Spinning	9,124	7,721	4,430	183,543
1. Silk winding	140	131	104	232
2. Silk spinning	1,458	1,207	1,242	6,577
3. Wool spinning 4. Mungo and shoddy pre-	2,611	2,326	705	54,488
paration	162	153	34	7,390
and spinning	1,662	1,373	746	22,228
6. Jute spinning	33	32	_	8,645
7. Cotton spinning	2,446	1,991	1,432	74,807
8. Vicuna wool spinning	107	106		8,235
9. Spinning of other material 10. Spinning of unspecified	150	124	50	679
material	355	278	117	302
c) Weaving, including ribbon				
weaving	144,548	119,326	100,121	508,010
1. Silk weaving	17,658	16,859	15,349	56,082
2. Wool weaving	26,035	23,756	19,755	153,098
3. Linen weaving	50,453	34,493	24,543	67,792
4. Jute weaving	187	112	132	5,839 147,121
	32,751	28,997	27,553	
Carried over	291,214	240,903	196,539	1,336,542

	Total	Of t	hese	
	number of establish- ments	principal establish- ments	domestic industry establish- ments	Number of persons
Brot. forward	291,214	240,903	196,539	1,336,542
6. Weaving of mixed goods 7. Weaving of unspecified	16,332	14,495	12,664	77,292
material	1,132	614	125	786
d) Rubber and hair-plaiting material	2,585	1,423	2,162	3,852
e) Knitting industries and stock- ing making	35,740	29,864	23,961	80,688
f) Crochet, embroidery and lace manufacture	21,660	18,253	15,277	43,674
 Crochet and embroidery Lace manufacture and linen embroidery 	9,242	7,359 10,894	5,892 9,385	14,599 29,075
g) Bleaching, dyeing, printing and		. 0,001	,,,,,	20,010
finishing	9,607	8,458	2,297	102,825
1. Silk dyeing and printing	311	300	86	6,732
2. Wool dyeing and printing	1,789	1,653	245	22,731
3. Linen bleaching and dyeing 4. Cotton bleaching and dye-	802	633	243	5,671
ing	1,223	1,109	358	32,618
knitted goods 6. Washing and bleaching of	618	506	434	5,556
laces, &c	778	575	727	1,156
establishments	4,086	3,682	204	28,361
h) Trimming manufacture	16,367	12,368	13,734	32,511
i) Cordage	7,829	6,955	340	20,917
1. Rope manufacture 2. Manufacture of nets, sails	7,131	6,352	207	17,464
and sacks	698	603	133	3,453
Total	248,617	205,292	162,435	993,257

The number of machines used in the textile industry, according to the statistics of 1895 is as follows:

	1. Carding machines	in	2.05%	octabl	31 220	machines
1			2,034	estaut.	•	machines
ı	2. Combing machines		-	**	5,248	**
	3. Mule machines		1,159	**	6,308	**
	4. Roving machines		907	**	19,060	11
1	5. Spinning frame machines			11	10,071,551	
1	6. Jacquard hand looms	19	5,801	11	•	machines
ı	7. Jacquard power looms	99	1,013	**	40,918	11
ı	8. Hand looms without Jacquard					
١	machine	77	22,304	,,	73,994	**
4	9. Power looms without Jacquard					
	machine		2,657	11	255,295	17
	10. Spinning mills for the produc-	,,	,	,,	,	,,
1	tion of gold, and silver threads,					
1	hand power		56		99	
1	11. Spinning mills for the produc-	**	30	**	33	"
ł						
4	tion of gold and silver threads,		7.1		174	
1	motor power		31	19	134	**
	12. Hand ribbon looms	,,	2,417	79	5,380	77
ı	13. Power ribbon looms		1,081	**	8,703	92
1	14. Hand twine machines	, ,	424	,,		spindles
ı	15. Power twine machines	11	1,395	19	17,353	11
ı	16. Hand bobbin and plaiting ma-					
ı	chines	11	171	"	551	machines
ı	17. Power bobbin and plaiting ma-					
ı	chines	11	353	**	24,018	11
ı	18. Hand bobbin-net-machines	19	149		283	11
ı	19. Power bobbin-net-machines	,,	265		1,568	11
1	20. Hand embroidering machines			,,	4,320	
ı	21. Power embroidering machines.	,,	491		2,381	11
ı	22. Hand multifold embroidery ma-	**	101	**	2,001	11
1	chines		119		295	
١	23. Power multifold embroidery ma-	11	119	11	290	19
ı	•		1		240	
	chines	, .	1	**	40	**
	24. Hand stocking looms	,,	2,274	• • •	9,465	11
	25. Power stocking looms	,,	462		11,018	
	26. Hand warp machines	,,	2,450		5,588	**
	27. Power warp machines		220		3,780	
	28. English hand looms	77	103	11	320	• • • • • • • • • • • • • • • • • • • •
	29. English power looms	**	71	11	828	11
	30. French hand looms	11	234	99	1,360	11
	31. French power looms	11	225		8,434	
Į				.,	,	

Motor power was used in 12,365 establishments, 11,115 establishments using 515,583 horse power. This power was developed by:

Wind	. 16	establishments		horse	power
Water	. 1,936	11	65,125	11	11
Steam	. 7,693	***	446,886	"	77
Gas	. 1,151	11	2,858	22	11
Petroleum	. 100	99	278	22	77
Benzine or ether	. 194	22	337	17	77
Hot air	. 39	11	67	22	11
Compressed air	. 2	11	32	"	11
Electricity	. 169	11	_	79	77
	11,300	establishments	515,583	horse	power

The textile industry is very unequally distributed throughout Germany. This is best shown by the following table, in which the number of persons given refers only to principal establishments, which are, however, not specified:

	•				
Province of East Prussia	1,960	establ.	altogether	3,074	persons
" " West Prussia	672	11	22	1,301	"
City of Berlin	2,914	11	11	15,266	11
Province of Brandenburg	7,454			54,474	
Domorania	1,912	11	99	3,184	11
	765	**	11	1,534	"
" " Posen		11	11	-	11
" " Silesia		**	11	90,911	71
" " Saxony	9,141	11	**	22,809	11
" " Schleswig-Holstein	2,474	**	99	7,279	"
" " Hanover	3,315	11	11	22,690	**
" " Westphalia	7,087	11	11	37,269	,,
" " Hesse-Nassau	3,110	11	22	8,921	
Phinoland	28,327			171,816	"
Hohenzollern	380	11	99	1,357	"
· -		- 11	• • • • • • • • • • • • • • • • • • • •		11
Prussia	103,009	establ.	altogether	441,885	persons
Bavaria	21,252	22	11	75,222	11
Saxony	85,428	11	11	267,441	**
Wurtemberg	9,513	11		39,968	
Baden	4,798		11	29,303	"
Hesse	1,645	11	79	3,518	"
Maddanham Calamain		**	79	•	11
Mecklenburg-Schwerin		11	11	1,720	11
Saxe-Weimar	2,844	11	99	8,818	11
Mecklenburg-Strelitz	250	11	99	361	11
Oldenburg	389	11	**	3,996	,,
Carried over	230,418	establ.	altogether	872,232	

Brot. foward	230,418	establ.	altogether	872,232	person
Brunswick	647	**	"	3,839	11
Saxe-Meiningen	730	**	**	4,194	"
Saxe-Altenburg	667	"	**	3,754	"
Saxe-Coburg-Gotha	812	79	**	1,447	11
Anhalt	287	**	"	1,302	11
Schwarzburg-Sondershausen	382	••	11	512	11
Schwarzburg-Rudolstadt	363	11	11	795	11
Waldeck	79	11	11	121	"
Reuss, the older	1,015	11	79	12,165	11
Reuss, the younger	843	**	"	14,147	22
Schaumburg-Lippe	495	**	11	629	"
Lippe	746	**		677	
Luebeck	121		**	171	"
Bremen	152	"	**	1,597	11
Hamburg	566	77	19	1,991	99
Alsace-Lorraine		"	17	73,684	77
German Empire		- 11	19		11

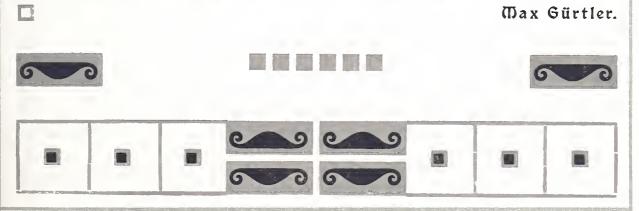
The value of the textile goods produced in the German Empire in 1897 amounted, according to statistics, to 2,749.9 million marks (see table 64 pages 207/208 "German Political Economy at the end of the 19th century"). The "Annual of statistics for the German Empire" (page 85) quotes the following figures concerning the export of raw materials and manufactures in the textile and felt industries, as well as clothes from German customs territory:

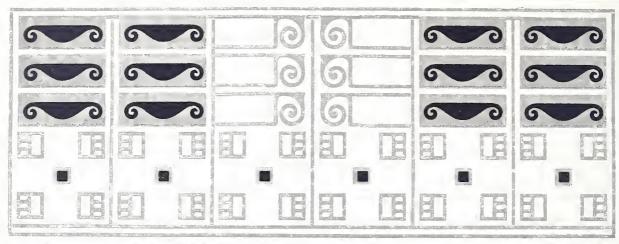
	1897 million marks	1902 million marks	
Sheep wool, raw		29.7	
Carded wool	25.0	27.0	
Wool yarn		62·5	
Cloth and woollen goods not printed	144-4	159.4	
Woollen hosiery not printed	23.8	22.9	
Cotton yarn	21.0	31.7	
Stout cotton goods, dyed, printed, &c.	62·7	81.2	
Cotton hosiery	53·6	72·9	
Half-silk goods, cloths, shawls	66.0	91.1	

As mentioned above, Germany obtains most of its raw material partly or wholly from foreign countries. No cotton or jute is produced in Germany, the former being imported principally from the United States of America, the British East Indies, Egypt, &c., the latter from the British East Indies. Flax

and hemp are grown in Germany to a slight extent, the greater part, however,
is imported, flax from Russia, Austria-Hungary, Belgium, &c. and hemp from
Russia, Italy, Austria-Hungary, &c.
The production of wool in the German Empire is decreasing annually:
in 1861 the number of sheep in round numbers was 28 millions, while in
1900 it had fallen to 10 millions.
Sheep breeding is principally carried on in Prussia, whilst Bavaria comes
next in importance, and is followed by Mecklenburg, Würtemberg, Brunswick
and Oldenburg. The enormous quantity of wool used in manufacturing in
addition to the home supply comes from the Argentine Republic, British
Australia, Great Britain, British South Africa, Belgium, France, &c. Carded
wool and woollen yarns are also imported from Great Britain, Belgium and
France.
Silk is produced in quite unimportant quantities in the German Empire:
raw silk comes principally from East Asia, Italy and France, and floss silk
from Switzerland and Austria-Hungary. Silk cocoons are imported from
France, Italy and China.
The importance of the import of raw-materials is shown by the follow-
ing figures:

	1897 million marks	1902 million marks
Cotton, raw	231.0	319-7
Flax	26 ⁻ 9	35.0
Hemp	23.9	23.5
Jute	21·9	35-2
Wool (also goat's hair, camel's hair, &c.)	218.7	273-9
Carded wool	32.9	53.8
Woollen yarn	99-1	86·6
Silk cocoons	0.376	0.264
Raw silk	89 ⁻ 5	117.7
Floss silk	20.9	27.1





EMBROIDERY, SPACHTEL, TAMBOUR, AND LACE INDUSTRIES IN GERMANY.

he development of these industries has been of such a manifold character during the last twenty-five years that it is necessary at the outset to specify the various branches, and to state where the chief manufacturing centres are located. They are as follows: 1. Hand and Machine Embroidery and Lace Manufacture in the Saxon Voqtland, the Erzqebirge, Bavaria, Silesia and Pomerania. 2. Manufacture of Hand and Machine Point appliqué, and Tambour Lace in the Saxon Voqtland, the Erzgebirge and Wurtemberg. 3. Manufacture of Open-Work, Double Tulle Curtains Laces in Eibenstock, Saxony. 4. Bobbin or Pillow Lace Industry in the Saxon Erzgebirge. 5. Manufacture of Guipure-Net, Point Lace and Ribbon or Insertion in Silesia, Saxon Erzgebirge and Bavaria. 6. Mechanical Lace Weaving and Bobbin-Lace Manufacture at Leipsic, Dresden and Barmen. There are also several isolated factories in Germany, engaged in these branches of industry and producing specialties such as tapestry, embroidered flags, quilted work, &c. Berlin, the capital of the Empire, is the most notable centre for the manufacture of these specialties. The manufacture of embroideries, point appliqué and frame lace was formerly an industry carried on at home in which the clever nimble hands of the mountain population were engaged. The modern inventions of embroidery machines, mechanical frames, lace and bobbin looms have however caused a complete revolution in the modes of manufacture, thereby increasing the wholesale production, and opening up new markets. The introduction of machinery has had very little influence, however, on the artistic character of these manufactures, as they demand from operatives

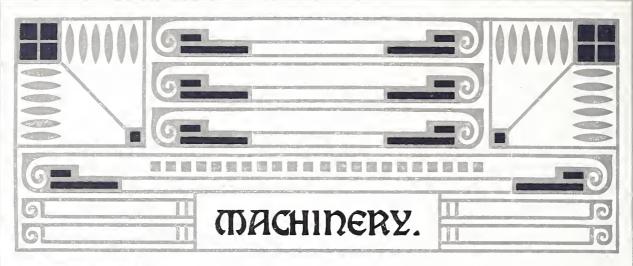
not only mechanical skill and intelligence but a high degree of artistic talent.
Art-Industrial schools have been established in all the principal manufacturing
centres for training capable workers and designers. The directors and teachers
tentres for training capable workers and designers. The directors and feachers
in these schools endeavour not only to keep pace with the advancing spirit
of the times, but to contribute essentially towards promoting the interests
of this industry.
The manufacture of embroidery was introduced into the Saxon Vogtland
and the Carachines by Time Dellain dutie at the first state of the
and the Erzgebirge by Anna Nollain during the latter half of the 18th century.
It was carried on as a hand industry uninterruptedly until the middle of the
19th century, and formed a profitable source of livelihood for the skilful in-
habitants of the entire district.
amove and a machines, invented by an insatial flamed fleffillalli, ill 1029,
were first introduced into the Vogtland in 1857, causing considerable detriment
to the hitherto prevailing hand industry: the flourishing machine industry
however has never been able entirely to supplant hand-work.
The manufacture of elegant underwear, monograms and flat-stitch em-
broidery executed in white and colours duese trimmines are analysided in
broidery, executed in white and colours, dress-trimmings, &c., embroidered in
various colours, headed passementerie, table covers and other ornamental
articles, form an flourishing branch of Industry at the present time in the
Vogtland and the Erzgebirge.
Great improvement in these industries, and increased capabilities on the
part of the operative are due to intercourse with Bohemia and the consequent
training of the inhabitants assuming the distribution of the inhabitants
training of the inhabitants occupying the adjacent Bavarian districts in cer-
tain kinds of technical work, such as open work, guipure net, &c.
A number of Saxon manufacturers are accustomed to have certain
articles embroidered in Pommerania (Stolp) and in Silesia.
Hand embroidery in Munich has attained a high reputation at the present
day. Table linen, elegant underwear and tapestries are the chief articles manu-
factured. Munich and the Heatland density to the Chief articles manus
factured. Munich and the Vogtland dominate the German market at the present
time in these specialities. The annual sales amount to one million marks, and
England, France, Austria and the United States are among the markets supplied.
Limited space prevents a detailed enumeration of the individual establish-
ments engaged in manufacturing specialities.
The manufacture of machine-made embroidery and lace is the chief
branch of industry in the Vogtland at the present time, and 9,500 embroidering
machines are in operation there. Of these 3,300 are hand and 6,200 shuttle
system, all principally used for making cotton and silk lace. According to
statistics collected by the Plauen Chamber of Commerce for the district of
Plauen and the Principalities of Reuss in 1902, there were 1,283 shuttle and
1 873 hand ambraidaving machines in an austice. By the state of the st
1,873 hand embroidering machines in operation. No less than 300 firms in
Plauen, Vogtland, are engaged in the manufacture of lace and embroidery.
company other firms in the cities towns and villages of the Vogtland are occupied
in producing coloured embroideries in velvet and silk, embroidered gloves. &c.
A revolution in the existing methods of lace and embroidery manufac-
ture, and a consequent increase in wholesale production the extent of which

cannot yet be calculated, will probably be caused by the recent introduction
of automatic embroidering machines. At present about 200 such machines
have been introduced and are at work. The construction and capability of
these machines are remarkable, and the quality of lace manufactured is
faultless.
The enormous proportions of the Saxon machine embroidering industry
have only been attained since the introduction of tulle embroidery in 1880,
the invention of the shuttle machine and the employment of the etching pro-
cess which was invented about the same time. A new basis for the technical
development of the industry was thus formed, which led to the establishment
of a special designing school in Plauen, Vogtland in 1877. This school now
bears the name "Royal Art School for Textile Industry" and gives important
evidence of the artistic worth of the aforesaid invention.
Machine embroidery in the Vogtland was confined to work on firm
material until 1880, when the introduction of tulle embroidery disclosed a
new field wherein the intelligence of manufacturers, designers and embroiderers
could be active. The embroidered tulle lace, which has attained a world-wide
reputation under the name of "Saxon point," has never been removed from
the list of manufactured articles in spite of the variable fashions which
have prevailed. Alone, or in combination with "etched lace," recently intro-
duced, it continually offers incitement to new and unique products of the
lace industry.
next to tulle embroidery, the so-called "etched-embroidery" forms at the
present day the chief article of Vogtland industry. This is a machine-made
lace, and consists of cotton or silk embroidery on material which is after-
wards removed by etching, leaving only the embroidery.
This new technical process renders it possible to manufacture all kinds
of lace in faultless style and workmanship.
The export of Vogtland embroideries before the introduction of lace em-
broidery was quite inconsiderable. It did not amount to the twentieth part
of the present production. Up to 1880 the market only comprised Austria,
Russia, England, Denmark and Sweden, whereas since that time France, Eng-
land and America have been the chief countries importing it.
The principal centres of Point appliqué and Tambour lace manu-
facture are in Saxony and Würtemberg (Ravensburg, Mengen). Similarly
with other sorts of embroidery and lace, they are also made by hand and
machine.
Point appliqué bears the unique name "spoke-work" in Germany, after
the method of manufacturing. The technical execution consists in joining
embroidered or tamboured designs with spoke-like stitches, and then cutting
out the ground material forming the insterstices.
Workers engaged in making Point appliqué and Tambour lace by hand
chiefly produce fine articles of attire, dress trimmings, children's underwear,
covers, &c. Machine work is principally used in making curtains, stores,
bed-coverlets and other articles designed for ornamenting dwellings.

no reliable information can be obtained concerning the time when this
branch of the industry was introduced into Germany; the inhabitants of the
Saxon Erzgebirge probably learned and employed the tambour or "chain"
stitch about the end of the 18th century.
Point appliqué and tambour work became an important article of mer-
chandise after the introduction of the Cornely triple-needle sector-machine.
training after the introduction of the covering and equalified these inches
Until then all attempts to manufacture curtains and coverlets were unsuccess-
ful on account of foreign competition; at the present time however, this
speciality has developed to such an extent in Germany that neither foreign
competition nor the flourishing condition of tulle-lace manufacturing in Saxony
competition not the mourishing condition of tune-face manufacturing in bakony
can affect it. Its success has been due not only to the business talent of
manufacturers and the progress in skilled workmanship, but pre-eminently to
the artistic character of the manufactures.
The attistic tractacter of the manufactures.
According to the latest reports the sales of machine-tambour and Point
appliqué curtains (frequently executed in loop stitch), bed-covers, window
curtains and edging for the same, have increased considerably. The improve-
ment in this industry, especially in the development of its fine artistic taste
ment in this industry, especially in the development of its time actions that
and in the creation of novelties, assures it a brillant future.
Besides the above mentioned appliqué and tamboured work, curtains,
stores, and coverlets trimmed with ribbon and lace have become very popular
lately. Germany is the chief market for this branch of industry, although
lately. Germany is the time matner for this stated of moustry, almough
considerable quantities are exported to Austria, Holland, Belgium, Sweden and
Norway, England and Canada.
There are 424 firms in Vogtland and the Erzgebirge engaged in manu-
facturing lace, hand and machine-made embroidery, tamboured and appliqué
lacturing lace, hand and machine-made emotoracty, tumorated and appropriate
work, and their annual production, calculated on the amount of sales, is valued
at 65,000,000 marks.
The chief centre in Wurtemberg of the Tambour and appliqué industry is
Ravensburg, and it has been located there since the middle of the last century.
Adventisority, and it has been rocated there since the manual of the man
Its present importance however was attained in 1880-90 through the manu-
facture of fine curtains skilfully executed in the Venetian style.
It is a well-known fact that the tambour and appliqué manufactures
at Wurtemberg are of excellent quality, and that they have an annual output
of about a million marks.
Ten firms at Ravensburg and one at Ulm, employing from 1,500 to
2,000 female hands and 300 machines, are engaged at present in the manu-
facture of point appliqué curtains and coverlets. Their market includes Ger-
many Chaland the United States and South America
many, England, the United States and South America.
The simularity between the manufacture of open-work and double
tulle curtains of the Saxon Erzgebirge (Eibenstock and Schönheide) and the
previously mentioned industry, consists of the tambour or chain stitch being
used for both. The distinguishing characteristic, however, is the absence of
used for bottle offe distinguishing statements in area road for sublication
all plastic affect; no material of close texture is ever used for application,
such curtains, covers, lace, &c. being exclusively made by hand. This work
necessitates such technical perfection that it must be classed among the most

delicate and exquisite manufactures of the Saxon textile industry. The market
for these expensive lace curtains is confined almost exclusively to America,
as they are scarcely known in Germany, and therefore very little used.
In spite of the competition of machine made lace, Saxon hand-made bobbin
lace is an important product, being a highly valued and popular lace among
certain classes of people. Several thousand female hands are consequently
engaged in this industry in the Saxon Erzgebirge (Schneeberg, Schwarzenberg).
Such a continuous market exists for linen lace and insertions with
twisted and plaited groundwork, strong linen corners and edging for cushions,
coverlets and scarfs, Torchon lace, Torchon and Guipure handkerchiefs and
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table covers, tablecloths and curtains, &c., that frequently the demand can
scarcely be met. There are 28 schools in Saxony, whose aim is to instruct
women in the art of making bobbin lace. In 1896 these schools registered
1,329 women and 36 men as pupils; in 1897, 1,380 women and 23 men; in
1898, 1,391 women and 16 men; in 1899, 1,381 women; in 1900, 1,335 women;
in 1901, 1,326 women, and in 1902, 1,355 women.
In addition to these schools for bobbin lace, there is a school for Lace
Designing at Schneeberg. Only such pupils are admitted there as have
passed through the ordinary bobbin lace schools. The pupils are taught to
make the most artistic patterns of Torchon, Guipure, Cluny, Idria, Malines,
Chantilly, Brussels, Mechlin, Duchesse, Valenciennes, and various kinds of
point and coloured lace, and the school has established agencies with sample
rooms at Dresden, Berlin, Edinburgh, and recently at Schneeberg.
Since the introduction of point-lace and guipure net into Silesia, the
Silesian lace industry has developed into a profitable means of livelihood for
the inhabitants. During the winter season especially, it is carried on as a
domestic industry, and gives employment at the present day to about
1,500 women living in the districts lying along the Austrian frontier.
The most recent industry established in Germany is the mechanical
manufacture of woven and bobbin lace at Leipsic, Dresden, and Barmen.
It originated in England, and great difficulties were experienced at first in
operating the extremely complicated weaving and bobbin machines and in
, , ,
dressing the lace, so that several years elapsed before the enterprise became
profitable. The manufacturers at the present time are confined to laces easily
made, which can compete in the German market with Nottingham and Calais
wares, viz., trimmings for underwear, Tatting, Torchon and Valenciennes lace.
The unique and tasteful patterns, produced recently by German mechan-
ical factories of woven and bobbin lace, have become quite popular.
At Leipsic there are 51 lace weaving machines in operation. One machine,
working 12 hours daily, produces annually lace valued at 30-40,000 marks.
Curtain machines are employed for manufacturing certain kinds of lace,
used for decorative purposes, such as church ornamentation, &c.
At Barmen, lace is manufactured on the ribbon loom (ribbon-loom-lace),
and on machines with belt-gear (plaited or bobbin lace); only a few years
DAIR RIADSRI SINCE IZCE WEZINDE MZCHIPES WE'S INTROURCED I DE OSTANISHMONIS

are employed for the manuengaged in this work, an	le information tistics show to the star Barmen wourable, the suffacture of land wages appoidery (include stry; 43,674 aches of induants, cotton marks, cotton (silk or particle (embroidery)	n can be obtained conchat there are about 5, aiting machines, 100 and in the neighbou majority of the looms ice. There are about 7 proximate 8,000,000 660 establishments ending crochet work); opersons (12,113 men a stry, including forem dery exported in 1902 n embroidery 25,162 read lace (made with silk with metal thready silk without metal the on woolen materials)	cerning the amount 000 ribbon looms, 0,000 rollers and rhood. and belt machines 7-8,000 workmen of marks annually. Gaged in the manufe these 15,277 belond 31,561 women) en. 2 was as follows: 2,000 marks, embobbin or needle) s) 323,000 marks, hreads) 2,563,000
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ntiring activity in the field of industrial technology on the one hand and research and classification in all branches of natural science on the other, have paved the way to the perception that the objects of the outer world do not owe their existence to the caprice of fortune nor to blind chance, but that the production of the very simplest article, natural

or artificial, requires a sequence of circumstances and effects, which owing to its similarity in the most various domains has been recognized as a universal principle, viz., the principle of evolution. In technology this principle is self-evident; it follows from the conception of work, and from the fact that bodies can only change their position or form through work. In machine construction the principle has long been recognized that for every new form to be produced new forms of tools are also necessary, as well as new machines to work such tools. Owing to the record-breaking discoveries of the great inventors of the last century, and the development of a science of technology, the connection has been found between natural and artificial products, for it has been shown that both sorts of development are regulated by the principle of adaptation. The unconscious effect of the forces of nature and the conscious activity of mankind work according to the same great uniform principle of gradual evolution and adaptation to all aims or conditions.

Were it possible to produce a perfectly complete international exhibition upon this basis, we should have indeed a picture of human activity such as it would be impossible to improve upon. Since however at every exhibition the wishes and views of the individual exhibitors have to be taken into account, and since these exhibitors will be sure to chose those of their manufactures and products for exhibition which they consider best suit their own interests, it is scarcely probable that such a goal will ever be reached. The country where the exhibition is held is in the best position to offer a complete representation of its sciences, industries, and technology by its exhibits, for it suffers least from the difficulty in making proper arrangements, and in transporting and arranging its exhibits. Foreign countries, particularly European ones, will only

be able to show a few examples of their industrial and technical capabilities
at so remote a spot as St. Louis, and must therefore have recourse to supple-
menting and explaining their exhibits by words, pictures, or figures.
lt is the object of the present treatise to point out the characteristic
features of the development of German machine construction, and to show
the present condition thereof.
The purpose of all machines and engines is without exception the per-
formance of work capable of being put to industrial uses. Work is performed
when a force acts along a given direction; scientifically expressed work is
the product of work and direction. These two factors of the conception of
work, force and direction, or better, force and motion, correspond to the known
division of all engines into generating machines and working machines, and
to the direction of the perfection of both classes.
In generating engines the forces of natures, such as heat, water power,
or wind, are forced into certain paths; their task is the production of work, of
kinetic energy, in directions already determined, or, in other words, the trans-
formation of the energy present in nature to the purposes of industry.
The purpose of working machines is to utilise the energy which has
thus been induced to follow certain fixed directions for the production of
industrially useful and saleable products.
The standard for judging generating engines is, according to the general
view, their effective power. This standard is, however, a one-sided one, for
no less importance should be attached to the reliability of their working, which
is essentially determined by rational construction, by clever arrangement of
the working parts and distribution of the moving masses, by the capability
of the whole engine to resist inner or outer influences, by the judicious
structure of the whole to make the operator's work lighter, by employing forms
suited to the working forces, and by observing all the physical conditions ne-
cessary for the permanent running of the engine. The economical standard
of a power plant is not the same for all countries, at all times and under all
circumstances. In Germany much importance is attached to securing a high
degree of economy, because economy has to be exercised in the utilisation of
the quantity of energy present in nature. Consequently in power engines of
German origin all the above-mentioned considerations are strictly observed.
A high degree of effective power is aimed at in steam-engine plants, for
example, both by employing perfect heating arrangements and good steam
boilers capable of absorbing the heat, and also by thoughtful construction of
the whole engine. Safety in construction is apparent in the forms and pro-
portions of the separate parts of the engine, and certainty of movement from
the accuracy of the working parts; adaptation to working forces and harm-
ful resistance, depends upon the forms and relation to one another of the
bearing-linings, slide-faces connecting rods and the like; complete using up
of the steam generated and consideration of the dynamic forces depends upon
the compound system now almost exclusively employed. Engines are adapted
to the most varied industrial nurnoses by suiting them to the number of

revolutions of the working machine, or to the working of the masses to be
set or maintained in motion.
The marine engine of many thousand horse-power, which, on their rock-
ing base, transmit their whole force to the propeller shaft day after day
without interruption only became possible through the perfecting of the engine
in working and constructive respects, as well as though improved methods of
manufacture. The perfection of the marine engine is to a certain extent a
standard for the degree of excellence attained; marine engines with balanced
movements (Schlick's patent) give German vessels a speed hitherto unexcelled.
The properties of steam as a motive force are met by the concentrating,
or in other words the enlarging of the power producing plant. Large boilers
mean a higher economic working effect. Large steam cylinders incur con-
siderably less loss by condensation than smaller ones. The compound system
necessitates the use of high-pressure steam as well as of larger steam cylinders.
All these requirements come to a head in the ever increasing demand for power
in marine engines of unusual size. Steam engines of three, four or five
thousand horse power for use on land, are employed for the production of
power in electric generating stations, mills, spinning and weaving factories,
rolling mills and so forth. The largest land engine, of 7,000 H.P. was turned
out only last year by the "Görlitz Maschinenbau-Aktiengesellschaft" for a
Berlin generating station of the "Allgemeine Elektrizitäts-Gesellschaft." The
high standard reached in the science of steam engines in general is proved
not only by the work of the company just named, but also by those of such concerns as the "Vereinigten Maschinenfabriken Augsburg-Nürnberg," Messrs.
Borsig in Berlin, the "Berliner Waschinenbau-Aktiengesellschaft vorm. Schwartz-
kopff" at Berlin, Richard Hartmann at Chemnitz, Egestorff at Hanover, Luther
at Brunswick, Haniel & Lueg at Düsseldorf and many others.
The steamers built by the "Stettin Waschinenbau-Aktiengesellschaft Vul-
kan" are known all over the world. On the ships of these yards, which were
only established in 1857, 261 vessels have been built, 66 of which were large
or small men-of-war, 146 screw propelled steamers for the merchant navy,
and 49 paddle steamers of various sorts. Of the larger steamers we will only
mention the "Kaiser Wilhelm der Grosse" with a gross tonnage of 14,349,
the "Kronprinz Wilhelm" with 14,908, and the "Kaiser Wilhelm Il." with
19,360. The express steamer "Kaiser Wilhelm II.", with a length of 706'6",
a breadth of 72' and a depth, to the lower promenade deck, of 52'6", is
one of the largest vessels at present affoat. The engines are of 42,000 H.P.,
and their displacement, when laden, 2,600 tons. The vessels turned out by other
yards, such as the "Germania Werft," and Messrs. Howaldt at Kiel, Blohm & Voss
at Hamburg, Kaiserstieg at Hamburg, and others, are also known all over the
world; they one and all point to the high standard attained not only in naval
construction, but also in engine construction in Germany, for each of these
huge vessels constitute nothing else than a complete engine-works in itself.
From the recognition of the fact that but a small total effective working
force (about 12–15 per cent) can be obtained by employing steam as the medium

in motors, and owing to the demand for small motors of other sorts, the
construction of gas engines, with which the famous name of Dr. Otto will
always be connected, has been developed. These engines formed the model
for petroleum engines, and particularly for the benzine motors which have lately
come so much into use for motor cars.
As far as the technology of heat is concerned, this form of motor shows
a rise in working effect, for even in comparatively small engines, about
15-20 per cent of the heat contained in the gas or petroleum is turned to
account. For certain purposes, such as small works, they possess the advan-
tage of economising space, since they require neither boiler nor chimney.
Great attention is constantly being paid to the degree of effectiveness in
these engines. In the Diesel motor as much as 28 per cent of the heat supplied
is converted into effective work, and 40 per cent into indicated work.
At first gas engines served for driving small machines, &c. Their develop-
ment during the first decades is marked by machines of 5, 10 and 15 H.P.;
in the eighties engineers began building gas-motors of several hundred H.P.;
and towards the middle of the nineties the first gas-engine was built on
v. Oechelhäuser's duplex system, having about 600 H.P. The great success
which attended this engine, owing to its utilising the waste gases from
smelting furnaces, resulted in a stride in the increase of the size of the motors
which had never been anticipated. At the end of last century the capacity of
such motors had risen to 1,000 H.P., and they have now been brought to suit
all requirements in the larger mining works; motors of two, three and four
thousand H.P. are already at work, and others are in course of construction.
There are essentially three different systems of these engines, the Deutzer
quadruplex, the Oechelhäuser duplex and Körting's single system. During the
short course of development which all these large engines have taken, far
more than 200,000 H.P. have served for the production of power. In addition
to the firms named above, we must also mention the "Nuremberg Maschinen-
bau-Aktiengesellschaft," Messrs. Borsig, Haniel & Lueg, Benz of Mannheim,
and others.
The reason for this remarkable increase in the construction of gas engines
lies in their better utilisation of fuel and the consequent cheapening of the
production of power. The unit of effectiveness costs in a gas engine less
than a half or a third of what it does in a steam engine.
As driving gas for larger engines, ordinary illuminating gas is not em-
ployed, but either so-called high-pressure gas, Dawson-Gas, or else suction
gas, for the production of which latter the works of the German firm Julius
Pintsch have bekome pioneers. These suction gas plants enjoy special popularity
in Germany because they require little attention, and do not necessitate the
assistance of a licensed steam boiler for working. Such plants can be put
up in any suitable spot, and in Berlin, for example, they are placed in the
basement or on the ground floor of some of the larger hotels in the immediate
neighbourhood of the reception rooms, without the guests noticing the presence
of an engine in any way. This circumstance means, moreover that gas engines

are effecting a decentralisation of generating stations, which at the same time
places a limit to the excessive increase in the net-work of cables for electric
mains.
The other side of the conception of work, viz. the movement, the con-
stantly repeated action of the tool and the article worked upon, which
is the fundamental requirement for the conversion of the latter into com-
mercially useful products, is evident in working machines of every kind. In
the perfection of the working machine many branches of industry in Germany
have had their share. The aim throughout is to introduce automatic action
in the construction of machines as far as possible. This occurs in the manu-
facture of many wholesale articles where similarity of all products manu-
factured by one and the same machine is required.
Although machine construction is of an international character, yet the
views of the constructors and the habits of the operators, as well as the
surroundings of the machine, result in a type peculiar to the country where
the machines in question originate.
The machines for the working of iron and wood in Germany, have, it is
true, some similarity to those of other countries; nevertheless not a few
peculiarities have arisen, particularly owing to the tools used, the fashioning,
the application of safety appliances, the enclosure of automatically acting
machines, and the customs and social position of the operators. In Germany
a tendency is becoming more and more prevalent to enclose the working
portions and tool-parts of the machine, partly for the protection of the machine
itself, and partly for the protection of the operator; this of course is done
without impairing the capabilities of the machine.
The recognition of the fact that in a machine enclosed and dependent
only upon itself, the increase of the speed of working depends only upon
reliability of construction, has had a great influence upon the exact perfection
of the machine with regard to the forces and friction occurring therein. This
is not only true of those machines which consist of rigid bodies, but it ex-
tends to pumps, compressors and the like. In this respect also the increase
of the working speed has made great strides.
Following the general tendency of the times in all industries, all mecha-
nical work, which does not require high intelligence is being gradually taken
out of the hands of the operator and relegated to machinery. In the textile
and paper making industries, in the book-printing industry, and in the
manufacture of flour, cement, &c., this principle has been brought to completion,
and other manufacturing operations are following. The metal industry, the
production of articles of food, the pottery and brick making industries and
others as well, are continually making further progress in the employment
of machines for saving work and power.
lt is impossible within the bounds of a short introduction to do justice to
the importance of the industry of machine and engine construction in every re-
spect. The present condition can, however, be demonstrated and supple-
mented by some statistics of the exportation of German machines and engines.

MACHINERY .

According to the "Statistical annual for the German Empire," the exportation of German machines and engines has been as follows:

	1900		1901		1902	
	dz (= 100 kg)	Value in thous- ands of marks	dz (= 100 kg)	Value in thous- ands of marks	dz (= 100 kg)	Value in thous- ands of marks
Locomotives (locomotors and traction engines). Steam boilers, with and without tubes, steam engines, turbines, pumps, ventilator-fans for factories, blast en-	122,926	15,716	183,204	21,068	197,368	20,500
gines, rolling machines, steam hammers Machine tools, transmissions, machines for cutting and punching metal,	414,136	32,713	334,772	24,650	440.917	29,758
lifting engines Cardingengines and cards, cotton spinning machi- nery, looms, machines for wood pulp and pa- per making, machinery	165,259	13,511	154,104	11,486	388,689	26,000
for treating wool Agricultural machinery, brewing and distilling machinery, grinding	213,493	19,928	182,526	15,505	224,826	17,297
machinery Electric motors Sewing machines, &c	216,716 129,178 75,721	22,585 23,252 7,572	196,627 124,596 77,025	17,495 19,935 7,703	225,919 134,498 80,554	19,298 21,520 8,861
Machines for various industrial purposes	1,007,748	80,620	873,089	65,482	480,788	33,655

Wilhelm Hartmann.



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f we pass the great technical achievements of the last century in review, our gaze is arrested by the latest and most stupendous conquest made by man, that of Electrotechnics, which, based on exact science, first developed in the application of weak currents.

In 1833, Gauss and Weber constructed the first telegraphic plant in the world which connected the Observatory at Gættingen Physical Laboratory. Prof. Steinheil of Munich shortly afterwards

with the Physical Laboratory. Prof. Steinheil of Munich shortly afterwards improved the telegraph, being the first to use the earth as a return circuit. The discovery of electro-deposition by Jacobi occurred at the same period.

In placing the date of the birth of electrical-engineering in the same year as that of the first practical use of the electric current, it is clear that what is now-a-days understood by the term electrotechnics could by no means have grown from such beginnings only. The connecting link between electricity and engineering was missing. The means of obtaining great working power from electricity was unknown, in short, the way to connect electricity with mechanical engineering was still a question of the future.

No practical use of the arc light, invented by Davy in 1810, or of the electro motor, constructed by Dal Negro in 1834, could be made as long as this gap existed. In 1866 however, Werner Siemens established the dynamo-electrical principle, and thus found the missing link. By constructing the first dynamo he gave rise to the possibility of generating a large quantity of electrical energy in a cheap and simple way.

Engineering thus obtained a new form of energy as a working power, we may say energy in an improved and more versatile condition, which, owing to its cleanliness and easy manipulation, soon made its way and took possession of a large field of operations.

Werner Siemens can therefore be called the parent of strong-current technology. He occupied himself at an early date with the study of Jacobi's invention of precipitating copper from a solution of cupric sulphate, and hit upon the invention of gold and silver electroplating. It is well known that we have him to thank for many improvements in telegraphy, especially

in the submarine branch. It was he who introduced the condenser for use in submarine telegraphy and who laid the cable between Sardinia and Algiers. His theories on cable laying have been considered as fundamental ever since that time. His name is closely connected with researches on purely scientific subjects, and stimulated in his work by his intimacy with Helmholtz, du Bois-Reymond, Clausius and Wiedemann, he became the author of many scientific improvements of which the most important and fertile was the introduction of the mercury unit for electrical resistance, called after him. Science further owes a number of important measuring instruments to him, several of which are still in use although their forms have been somewhat altered.

His business relations with Halske, a mechanic, led in 1847 to the establishment of the world-famed firm of Siemens & Halske. Their first venture was the construction of telegraphic apparatus, and they put up one of the first telegraph wires in Europe, that from Berlin to Frankfort.

Dynamo machines could only be used for electric light on a limited scale, as in spite of the improvement of the ring armature invented by Zenibe Gramme, a Belgian, no one knew how several arc lamps could be fed from a single circuit, or how to "divide" electric light, as it was termed. When regulating one lamp the others were sure to be affected, or a separate machine had to be worked for each light. Jablochkow practically solved the problem, preventing the movement of the carbons towards each other by fixing them side by side.

Through the invention of incandescent lamps, shortly afterwards made by Edison, and the simultaneous first use of a parallel arrangement, whereby every lamp was independent of the others, in contra-distinction to the series connection, electric light was suddenly turned into a formidable rival of gas light.

It was Edison again who furnished the "Columbia" in 1879 with a parallel arrangement plant for 115 incandescent burners. In the following year he built the first municipal central station for electric light in New York, which even at that time presented all the characteristics of a large central station of the present day. We owe to him and Hopkinson the invention of the three-wire system, which allows a much greater distance to be traversed without any increase of tension. This system was, however, not efficient for carrying the current over very long distances, nor for supplying very large districts. With the knowledge that the costs of distribution are diminished by increase of tension, the transmission of alternating currents at a high tension was essayed. As however the consumption tension is dependent on the lamps, it was found advisable to reduce it to a simple current before delivering it to the consumer. The first to come forward with a practical arrangement for this purpose was Lucien Gaulard, who used an induction coil; there were, however, a great many drawbacks to this system, which were only removed in 1885 by the distributing system of the engineers Zipernowsky, Dery and Blathy, and by the introduction of their poleless transformers. The new system was exhibited at the "Landesausstellung" in Budapest,

and with it the alternating current machine, which had fallen into disuse, came into favour again. The use of the three-wire system with continuous currents led to the invention of the multiphase system for alternating currents by Tesla and Ferraris. The three-phase, or rotatory current, is the most common form of this, and has been adopted by nearly all larger German firms. Germany and the diligence of German engineers have contributed considerably to the further development of electrical engineering. The constructive deficiencies of the ring-armature invented by Gramme, which proved unsuitable for the generation of any particularly strong currents, were removed by von Hesner-Alteneck, at that time chief engineer to Messrs. Siemens & Halske, through the invention of the drum armature. This he brought out at the Berlin Industrial Exhibition in 1879, together with a differential lamp, a practical and useful arc lamp which for the first time allowed of several lamps being joined up in series. The firm of Siemens & Halske created a great sensation at this same exhibition by the first electric railway. In 1881 Edison's representative introduced the first incandescent lamp at the Paris Exhibition. The question whether the divisibility of electric light into the smallest units was of any value was a matter of great dispute at that time. A German engineer named E. Rathenau, recognising the importance of the incandescent lamp, secured the Edison patent for Germany, and founded the German Edison Company for applied electricity. Almost simultaneously he undertook to provide Berlin with electric power, and erected a plant which became a model for the construction and working of other central stations, the practicability and lucrativeness of electrical works on a large scale having thus been demonstrated. The manner in which the General Electric Company [Allgemeine Elektrizitätsgesellschaft) originated from the original Edison Co. is now a matter of history, and how it developed under Rathenau's management and yielded such important results in the domain of strong current technology is well known. In 1882 the Company had the opportunity of showing the German public this new light at the Qunich exhibition. This was an important exhibition, made specially interesting by the fact that it was there that the French engineer Marcel Deprez made a first attempt to transmit electricity over a distance of 60 kms. Although this experiment was considered a failure from a technical point of view, the efficiency of the transmission being only 25 per cent, it still had an encouraging effect on the development of electrical transmission of power, and shortly afterwards Brown, the head engineer of a machine factory at Oerlikon, in Switzerland, effected a transmission of 50 H.P. between Kriegsstetten and Solothurn, a distance of 7.5 kms, with a total efficiency of 75 per cent. The electrical transmission of power was, however, not definitively adopted as a working factor in engineering until the Frankfort Exhibition of 1891, when Brown, together with von Dolivo-Dobrowolsky, the chief electrician of the Allgemeine Elektrizitätsgesellschaft, were brilliantly

successful in transmitting power from Laufen to Frankfort-on-the-Main,
a distance of 75 kms; this performance resulted in the usual methods of trans-
mission of power till then employed being very speedily abandoned.
Electricity has gone on developing in every direction, even the invention
of Auer's incandescent gas light helping more than hindering its victorious
progress by increasing the taste for brilliant illumination amongst the general
public. Attempts have been made to secure the advantages of the Auergas-
-light for electric lighting, and it is evident that the solution of this problem
would result in a powerful impetus to electric lighting.
At present Germany supplies more than half the electric incandescent
lamps used in Europe, and exports her electrical manufactures to all parts
of the world, with the sole exception of the North American market which is
closed to her by customs barriers. The efficiency of the carbon thread glowing
in vacuums seems, however, to have reached a limit, for since the introduction
of the "Flashing" it hardly seems to have altered either in shape or capacities.
Great progress was made from an economical point of view by the
employment of Professor Nernst's Electrolyt lamp, in which rare earths are
used, and which has been handled in such a practical manner that the All-
gemeine Elektrizitätsgesellschaft has already disposed of two million of them.
This ingenious lamp, in which a secondary conductor diffuses light after having
been heated, saves about 50 per cent of electrical power, and can be used
for lights of 35 to 250 candle power. Although these lamps will not, as far
as can be seen, oust either the incandescent or arc lamp, yet they form a very
useful link between the two.
Professor Auer von Welsbach, who has contributed so greatly towards
the success of the incandescent gas light industry, has also constructed a
lamp which sheds its light by means of an osmium thread arranged in vacuum,
and is very economical, but only made up to the present for low tension
currents.
The greatest progress has, however, been made by electro-technics in
regard to their application to street railways, where they seem likely to supplant
all other systems. In this sphere of activity the German electric industry is also
very much to the fore. The number of towns supplied with electric railways was:
at the end of 1891, 3; 1892, 5; 1893, 11; 1894, 19; 1895, 32; on the 1st of August
1896, 42; 1st September 1897, 56; 1st September 1898, 68; 1st September
1899, 88; 1st September 1900, 99; 1st October 1901, 113; 1st October 1902,
125. The increase of railways as compared to 1901 amounts to 10.6 per cent.
The electric railways in running order in Germany on the 1st October 1902
totalled: whole length of line 3,388-48 kms; whole length of rails, 5,151-50 kms;
number of motor cars, 12,352; number of supplementary ordinary cars, 7,967;
whilst further tracks of a length of 362.49 kms with rails to the length of
386.30 kms were in course of construction. The total power used by the
electric railways was—exclusive of accumulators—122,076 kilowatts. The
accumulators represented a power of 30,052.5 kilowatts, so that the total
amount of working power in dynamos and batteries for street railway pur-

poses amounted to 152,128 kilowatts, or an increase of 24.7 per cent as compared to 1901.

The excellent results obtained by the Experimental Company for Swift Railways with the two swift railway cars constructed by Messrs. Siemens & Halske and the Allgemeine Elektrizitätsgesellschaft on the trial track between Marienfelde and Zossen, have become generally known through the daily press. They excite the astonishment of novices by the immense speed attained, and the recognition of experts by their safety and reliability in working and by their ingenious and simple construction. The speeds attained (210 kms per hour) are nearly twice as high as that of the fastest trains. The trials have demonstrated that such speeds cannot only be reached, but that the vehicles run much smoother and more reliably than at lower velocities. The work of the Experimental Company has thus supplied invaluable data for the practical solution of the important question of employing swift electric plant for public traffic; in this way it has been possible to cope with the problem of placing swift railways on an economical basis.

The development of German electric works has been perhaps even more marked, although it must be recognised that it has some what abated lately as compared to the years 1898—1900. One can fairly assert that there are hardly any towns of over 30,000 inhabitants in Germany that cannot boast of electric lighting. The dropping off in the increase of new works is not to be traced to any decrease in the efficiency of electrotechnology, but principally to the fact that the supply has to a great extent already been met.

The number of new electric works opened was: up to the end of 1888, 15; in 1889, 7; in 1890, 8; in 1891, 13; in 1892, 22; in 1893, 31; in 1894, 36; in 1895, 61; in 1896, 70; in 1897, 101; in 1898, 148; in 1899, 135; in 1900, 129; in 1901, 72; up to April 1st 1902, 14; not mentioned 8; total 870. The works are distributed in 843 townships, and 69 are either in course of construction, or their construction has been resolved on. The following table shows the alteration in the number of works and their supply in 1901 and 1902.

System	Number of works		Capacity of machines in kilowatts		Total capacity of ma- chines and accumula- tors in kilowatts	
	1901	1902	1901	1902	1901	1902
Continuous current with accumulators	600 24	684 25	122,367·7 4,634·7	150,499·7 6,154·2	168,314 [.] 0 4,634 [.] 7	208,748·3 6,154·2
Alternating current (one and two-phase) Rotatory current	44 45	45 52	27,547·5 40,759·0	30,483·5 75,925·0	27,547 [.] 5 41,634 [.] 0	30,543·5 77,756·0
Rotatory and continuous currents Alternating and continu-	43	50	86,985·1	86,614·5	102,510-9	106,559.3
ous current Monocycle generators	10 —	12 2	6,874-0	7,476 ⁻ 0	6,979 [.] 0 —	8,041·0 970·0

The electric machines in the electric works—exclusive of accumulators—can produce 357,992.9 kilowatts; in addition to this there are accumulators with a capacity of 80,779.4 kilowatts, so that machines and accumulators capable of supplying a total of 438,772.3 kilowatts annually were employed by the 870 electric works in Germany during 1902.

The following summary shows the motive power used in the electric works.

Working power	Number of works	Total work done in kilowatts
Steam	509 84 52 4 1	282,363·1 24,146·1 4,790·3 256 220
Mixed systems: Water and steam (one or the other partly in reserve) Water and gas (one or the other partly in reserve) Steam and gas (one or the other partly in reserve) Water and benzine motor Water, steam and gas Clectricity and steam (the first from another works) Clectricity and water (the first from another works) Not given	193 7 4 6 1 4 2 3	40,493·1 639·6 2,143 242·7 96 1,953 150 500
Total	870	357,992-9

- According to this over 58.6 per cent of the works employ only steam, and the work done by their machines amounts to 79 per cent of the total work done by the machines of all the works. The whole of the electric works fed 4,200,203 incandescent lamps, 84,891 arc lamps, and 192,059 electric motors. Reduced to Watt incandescent lamps, the total supply amounted to 8,506,175 normal lamps or 425,308.75 kilowatts.
- Of late years the use of electricity for chemical purposes has rapidly gained ground, owing to the increased utilisation of water power facilitated by electrical engineering. The manufacture of aluminium at a cheap cost price was made feasible by the use of the electric current. It is likewise used for the extraction of copper, gold and nickel from the ores, for the production of caustic soda and potash, and especially for the manufacture of calcium carbide, for which there has recently been an increased demand.
- The increasing use of electricity in every direction has given a powerful impetus to electrical engineering, and this again has re-acted on the already existing industries. In Germany for instance, more than half the steam engines and turbines turned out are used for driving dynamos.

The construction of steam engines has undergone a great change with regard to revolutions, precision of regulation, &c., by the requirements of electrical engineering, particularly those of the alternating current system. In other industrial branches also electricity acts as a stimulus, offering new problems, in the solution of which German engineering takes a prominent part. In fact it stands first in Europe, and is by no means behind the great American industry with respect either to working capacity or the quality of its productions.

There are 80 electrical engineering companies in Germany, with a total capital of 520 millions of marks, of which about 250 millions belong to manufacturing companies, and about 270 millions are invested in companies for financing and operating plants.

These companies carry out orders for 300 millions of marks annually, most of which come from abroad, as the requirements in Germany alone would of course not nearly amount to that sum.

The theory of waves established by the late lamented Professor Hertz has, as is well known, been made use of as wireless telegraphy for transatlantic communications, and in the army and navy much has been accomplished in this direction, the German Professors Slaby and Braun sharing with the Italian Marconi the merits of having elaborated this important discovery. The system has been made use of by Messrs. Siemens & Halske and the Allgemeine Elektrizitätsgesellschaft, and has been employed also by the government of the United States for many stations on the coast.

If we inquire how German electrical engineering came to gain such a leading position in the world's market in such a short space of time, we discover as the principal cause the thorough scientific training of the German engineer. In the works of the above named firms there are about 1.950 engineers, who have received their training at Technical high schools in addition to numerous technical experts. Of these 340, or 17 per cent, are directors or chief engineers; about 5 per cent are employed in the laboratories for testing machines and apparatus, for examining new inventions, testing and material; about 3 per cent are engaged in the calculation of machinery, apparatus, resistances and windings; about 19 per cent are occupied with the construction of machines, apparatus, switchboards, and railway appliances; about 4 per cent in the actual manufacturing, as heads of the workshops, or as managers of the works; about 5 per cent as managers of central light stations; about 9 per cent as superintendents of electrical installations; about 54 per cent are engaged in computing plans and estimates for central stations, transmissions of power, and railways; of these 33 per cent act as representatives of their firms abroad, and 21 per cent are working at home; 1 per cent take over the literary part, such as publications, statistics, and the preparation of catalogues.

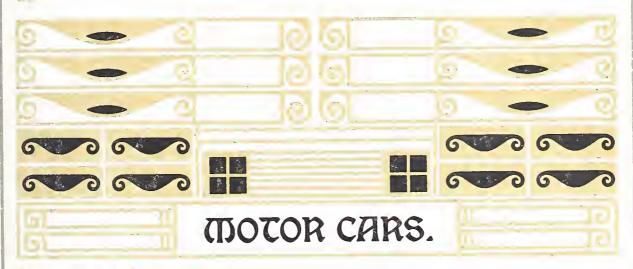
From this list it is evident that a division of labour has been carried out even in the intellectual part of electrical engineering; a similar process has been accomplished in the technical high schools where nowadays a great

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many lectures are held upon the different branches of electrical engineering and large laboratories suitable for practical work are fitted up, whereas formerly the entire teaching consisted of theoretical courses and a few lecture-room experiments.

The training of the German engineer keeps pace with the development of electro-technical science itself, and thus the conditions are fulfilled for enabling the German electrical engineer to successfully retain the prominent position he has reached by his industry and perseverance.

G. Klingenberg.





o the first half of the nineteenth century belongs the birth and perfection of the railway; within that period and the course of the few decades immediately following, the travelling public, while gaining an increase in speed which enabled them to set time and distance more or less at naught, became gradually accustomed to the unavoidable restrictions which the new order

of things imposed. During the latter half of the century, the growth of the cycle and motor-car industry and the state of development which it has since reached, have made the traveller once more independent of the permanent way, while at the same time leaving him all the advantages of rapid transit.

Cycle and motor-car are inseparable from the highways: the better these are, the lighter the tax on wheel and frame, and the less the driving-power required. As a fair test of the strength of construction, therefore, we must select rather the worst than the best surfaces which the vehicle will be required to traverse, and at the same time the maximum dead carrying weight must be taken into consideration.

Fruitless experiments in the way of locomotive carriages can be traced back as far as to Newton. Leaving these on one side, the new motor-car industry has found its origin principally in Germany, though it must be admitted that other countries, and especially France, have done much towards shaping the public mind to receive the new idea, as also in determining the

present form of construction, and in adapting the new vehicle to particular purposes. Among other firms, Messrs. Daimler & Co. and Messrs. Benz & Co. of Mannheim are known for their successful productions. The previously existing factor which determined the pattern of the wheels and frame of the modern motor-car, was the cycle, as the ordinary horse-car formed the carriage itself, and the railway engine suggested the driving principle. The motor-car then, is a combination of these three elements, viz., the wheels, frame and steering gear of the cycle, the body of the coach or railway. car, and the driving machinery of the locomotive. Perhaps the most surprising result is, that in spite of the short time of development, this extraordinary combination of three distinct elements has established new standard patterns of its own, though its adaptation to widely different uses has considerably divided the types, and will continue to divide them still further. Among the various other parts of the waggon—wheels, frame, steering gear, and brakes,—the most important of all are the motors. These may so far be classified according to four different systems: 1. Benzine motors, 2. Motors with steam engines and boiler, 3. Electric motors with accumulator, 4. Combination motors; i. e. benzine motors with electric motors and accumulators. Electrically driven motors have the advantage of greater mechanical simplicity in those parts which have to do with the variation of speed, the reversing motion, and the steering-gear; they have however the disadvantage of carrying a heavy dead-weight in the accumulators, and another in the fact that the machine does not generate its own power, but is dependent on central electric stations for its supplies. The benzine motor is more independent than the electric. Although the small motors used have no great power, the direct use of benzine is nevertheless cheaper than the complicated process necessary to turn the latent energy of coal into electricity by means of steam engine, boiler and dynamo, unless one presupposes the existence of large and frequent generating stations for the purpose. Benzine, too, is an article of commerce which can be had anywhere; and in this, the benzine car has the very great advantage of being absolutely independent of any central sources of supply. As a counterbalancing disadvantage, the benzine motor is greatly handicapped by the complexity of its construction. The driver of such a car must have a perfect acquaintance not only with the steering wheel and brake, but with the reversing and change-speed gears, and with the motor itself. He has a large number of handles and levers to attend to, and has to control the action of the motor at the same time. The car, moreover, carries special apparatus for ignition and cooling, which taken with the rest, makes the whole mechanism a complex system of interrelated parts, which it is necessary to study and understand before venturing to use. Nevertheless this type of car seems destined to take the precedence. The combination of benzine and electric motors has this very decided advantage, that the complicated change-speed and reversing motions of the former can be thrown out of gear when required, by replacing the benzine

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motor with the electric; the latter can also be used in crowded throughfares, thus enabling the car to be run in greater comfort by avoiding the unpleasant noise of the ignition explosions, and the smell of the exhaust gas. Once clear of the town, the benzine motor can again be brought into play, either alone or in combination with the electric one: the accumulators can be charged on downward gradients or on good roads which require but little driving power. Such a car has a motor which is complete in itself as well as a secondary motor, and is therefore a power-station on a small scale. Compared with the other two systems already described, this class of car has made comparatively but little progress.

- The steam-car, in addition to its engine, carries of course its own boiler, which, on account of the limited space and the large heating-surface necessary, can be nothing more than a water-tube-boiler, a type of steam-generator which requires special attention, as, having no reserve steam (the evaporation being only of the amount actually required by the engine), the water must be continually renewed from the supply tank. The driver of a steam-car has therefore to keep his eye on the heating apparatus as well as on the water.
- Handicapped as the steam-car is in comparison with the other kinds, it gains again in being able to dispense with all the complicated arrangements of the benzine car for driving, change-speed, and reverse motion, for its great advantage is that it carries the equivalents of all these in the machine itself. It is howewer at a considerable disadvantage in the uneconomical application of heat to raise water to the temperature required for the necessary steam pressure, the consumption of fuel being proportionately higher than in the case of explosively propelled cars.
- Of these four different systems, the one which has chiefly developed in Germany is the benzine motor. The leading firms, among which the "Daimler-Motoren-Gesellschaft" of Cannstatt, and Messrs. Benz & Co of Mannheim are the oldest and most noteworthy, have contributed much to their improvement; and, so far as the mechanical part is concerned, have by their enterprise and progress brought their cars into a prominent place on the European market.
- The advance of the motor car towards perfection shows steady progress: the secondary parts, particularly the valve gear, have gradually attained the complete finish of the steam-engine. The accessory parts of the older types of motor, which often required the additional help of springs or weights to regulate their movements, have in the modern types been brought completely under control. The fuel supply has also been regulated by contrivances, partly automatic, partly governed from the driver's seat.
- Another most important point for consideration, is the way in which the driving power is transmitted from motor to axle. This is accomplished by means of carefully adjusted shafts of a strength calculated to suit the kind of road the car is built for. Change-speed and reversing gear are so arranged as to operate smoothly and to be easily managed by the driver. The parts belonging to the steering gear are all brought together within

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reach of the driver's seat, and are combined with the rest of the apparatus for starting and stopping the car in such a way as to assure perfect certainty under all conditions of working.

The frame, the rigidity of which is of the greatest importance, is constructed of U-shaped wrought iron longitudinal framing-pieces so connected as to be as firm as that of a railway carriage which it in some way resembles, though naturally the purpose which it is to serve points to another form of construction. Axles and wheels, of steel or wood, or of both have been perfected through repeated experiment.

The stability of the car is best increased by keeping the centre of gravity as low between the wheels as possible. The lubrication of the frictional parts is so concentrated as to be easily supervised and controlled from the driver's seat. The working out of all details, especially of the bearings (which, wherever practicable, are ball-bearings) is most carefully attended to.

The exterior of the body of the carriage depends of course on the purpose to which it is destined. Messrs. Benz's "Parsifal" car is a type known everywhere, and the "Mercédès" of the "Daimler Motoren-Gesellschaft" is turned out in various forms under the names "Tonneau," "Phaéthon," "Coupé," "Roi des Belges," &c.

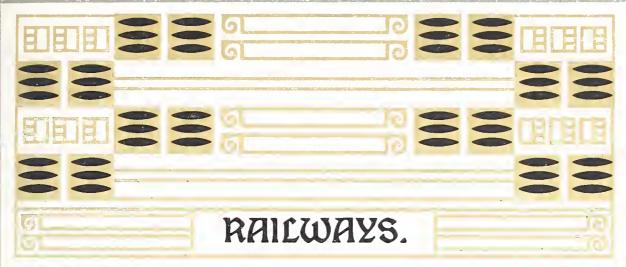
In addition to private motor carriages and racing cars, the German motor car industry has developed other types, such as omnibusses, coaches, breaks, travelling and shooting phaetons, motor cabs, military baggage waggons, drays, lorries, business vans, advertising vans, railway vans, parcels delivery vans and others.

Wilhelm Hartmann.











he introduction of railways into Germany was attended with many difficulties, inasmuch as public opinion was opposed to this new means of communication and the authorities adopted a waiting policy. The attitude of the authorities at that time was due to the fact that they considered the recently constructed extensive network of highways and roads, on which

large sums of money had been expended, sufficient to meet all the requirements made by traffic for the time being, and that these rendered all new means of communication superfluous. Furthermore Germany was divided into a large number of small states, and the prosperity of the land was so slight, that no productive or enterprising spirit prevailed. After the great importance of railways had been recognized however, and the construction of lines begun, the railway system developed very rapidly, so that at the present time Germany stands at the head of all European countries, as far as the total relative length of lines is concerned.

Companies formed for the construction of railway lines, were subject to the legal regulations of the various Federal States; each railway was consequently worked as an independent enterprise, and this soon led to the necessity of an agreement with neighbouring states in regard to the transit of waggons, uniform style of construction, receipt and delivery of freight, &c. Railway unions between the several connecting lines were consequently formed. The further extension of the network of railways and the increase in traffic finally led to a union of all the lines, carried into effect in 1846 by ten Prussian railway administrations, the new enterprise bearing the title: "Association of

German Railway Administrations."

The aim of this Association, which so enormously stimulated the development of German railways, was to promote the interests of railwaycompanies by conjoint action, and thus to serve individual interests as well as the interests of the general public.

The efforts of the Association were directed towards the establishment of uniform regulations concerning construction and traffic (technical agreement).

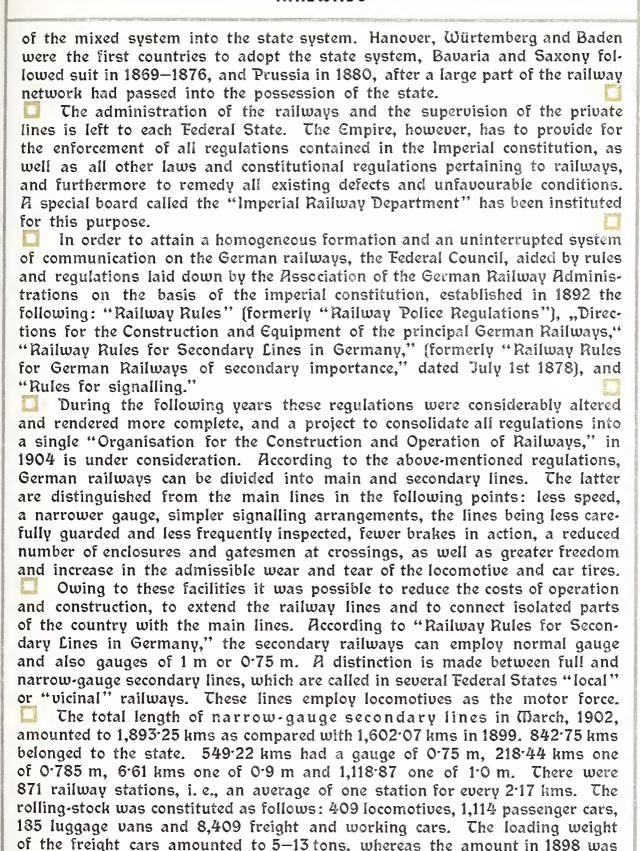
RAILWAYS

the regulation of the reciprocal use of waggons (agreement as to the reciprocal use of waggons within the province of the "Association of German Railway Administrations"), the organization and regulation of passenger and freight traffic, the establishment of railway time tables, uniformity of time, dimensions, weights and coinage, prizes for inventions and improvements pertaining to railway systems, &c. &c.

The Association, however, could exercise very little influence on the tariff. This, and the direct arrangements for conveyance of passengers and freight were regulated by special association tariff unions superintending the traffic in limited districts.

At the end of March, 1896, after fifty year's existence, 74 different railway companies, covering a distance of 80,998.11 kms in length, had joined the "Association of German Railway Administrations." Not only were all German railway companies members of the Association, but also the most important Austrian and Hungarian railways, as well as four in Holland, three in Belgium, one in Luxemburg, one in Roumania, and one in Russian Poland. In addition to the technical and operative regulations of the aforesaid Association, which are based on voluntary agreement, the German railways are directly concerned with the imperial laws, mentioned later on, and such laws as regulate by treaty international traffic with countries not belonging to the "Association of German Railway Administrations." The following may be referred to here: "Technical uniformity in railway systems" and "Regulations for fitting up railway carriages so as to ensure customs being levied in international traffic," accepted as valid by Germany, France, Italy, Austria, Hungary, Holland, Belgium, Roumania, Servia, Greece, Bulgaria, Luxemburg, Denmark, Sweden and Norway. Pertaining to the passage and use of freight waggons, the following treaties may be mentioned, in addition to the "Waggon Agreement" of the Association: "Italian Waggon Regulations;" "Swiss Waggon Union;" "Regulation of the International Union," concerning railway communication with the largest part of the Belgian and French lines, and the "Convention," valid for Alsace-Lorraine and the Eastern Railway of France. The contents of these treaties correspond to a great extent with the "Technical Uniformity" and "Waggon-Agreement" of the Association. Further the results of "Conferences for providing cars" regulate the passenger and freight cars in through trains, and "International Railway timetable Conferences" determine all railway connections. In order to facilitate in exceptional cases the connection of single waggons with express and passenger trains in international traffic, the claims of the several lines have been laid down in the "Lübeck Agreement."

The construction of railway lines in Germany was at first almost entirely in the hands of private capitalists. Later on the several Federal States concerned themselves with railway enterprises, so that in almost all the German states the mixed system of private lines and state lines existed side by side. After the majority of the main lines had been constructed however, and only the construction of less profitable lines was left, private capitalists withdrew. Finally the development of the railway system compelled the transformation



2-10 tons. Passenger traffic amounted to 192,173,148 kms, freight traffic to 85,185,596 kms. The capital stock was 118,838,707 marks, and the expense for 1 km of railway 67,626 marks. The receipts totalled 10,171,386 marks, expenditure 8,570,092 marks, thus leaving a profit of 1,601,294 marks, or 967 marks per kilometer of track. 4,200 officials and workmen were employed. In transferring freight from one line to another of different gauge, it is unloaded on an inclined plane and a tilting-cart employed, the body of the car being removed with a crane to another frame, or if full-gauge cars, conveyed on narrow-gauge rolling trestles.

The following "Statistics on Railway Traffic in Germany" have been taken from the Imperial Railway Department; they give information concerning the development, importance and commercial condition of the main railways in Germany. The report includes the operations of normal gauge secondary lines during the years 1901—1902.

The first railway—the Ludwig railway—was opened in 1835 between Nurenberg and Fuerth, and was followed in 1837 by the first sections of the Berlin-Dresden line, in 1838 by the Berlin-Potsdam line, and soon afterwards by the first state railway line, that between Brunswick and Wolfenbuettel. The following data show how rapidly German railways developed. The length of the lines (exclusive of small gauge lines) open to traffic in 1836 was 6 kms; 1838: 140 kms; 1840: 549 kms; 1845: 2,304 kms; 1850: 6,044 kms; 1860: 11,660 kms; 1870: 19,694 kms; 1880: 33,835 kms; and in 1898: 47,119·11 kms. The length of the existing railways at the end of Warch 1902 amounted to 51,092·01 kms. Of this length 46,730·64 kms were state railways (31,197·21 kms main line and 15,533·43 kms secondary lines*) and 4,361·37 kms private railways (1,255·69 kms main line, 3,105·68 kms secondary railways).

Including all tracks let, leased and worked conjointly, the length of lines in use amounted to 51,328.29 kms including 4,343.44 kms of private railways, and was distributed as follows:

	Main lines	Secondary lines	Total
State railways and those under state management	31,366-68*)	15,618·17*)	46,984·85
management	26.61	114.03	140.64
State railways under private management		18.43	18-43
	1,387.03	2,797·34	4,184.37
	32,780-32	18,547.97	51,328-29

^{*)} The length of railways in operation, main and secondary lines has been taken from the statistics published.

32,816.74 kms of private lines had single tracks, 18,103.32 kms double tracks, the rest three and four tracks. 70.50 per cent of this length lay in the straight, and 29.50 per cent in curves.

	Over 100 sqmetres area	For 10,000 inhabitants
in Alsace-Lorraine	11 ⁻ 48 kms	9.64
" Prussia	8.80 ,,	8.86
"Bavaria	8.90 ,,	10.85
"Saxony	16.38 ,,	5-78
"Wurtemberg	8.61 ,,	7.70
"Baden	12.56 ,,	10.05
,, Hessen	16.03 ,,	10-90
" Mecklenburg	8.70 ,,	21.67
Germany 1901	9 [.] 44 kms	8-98
,, 1898	8-92 ,,	8.88

The capital stock invested for full-gauge main and secondary lines was as follows:

Of this capital about 18.5 per cent was expended in rolling stock. In addition to bridges, subways, &c., there were 11,570 bridges of 2–10 metres span, and 1,059 bridges with more than 10 metres span of the separate arches. Many of these bridges are of superior construction with spans up to 170 metres. The chief details regarding some of the largest bridges can be obtained from the following table:

Year of opening	Name of bridge	Number of openings	Span	Total length
		, , ,	metres	metres
1857	First Nogat bridge (the second			
	in 1890) near Marienburg	2	103.2	206.4
1857	First Vistula bridge (the second			
d	in 1891) near Dirschau	6	121	726
1859	Rhine bridge near Cologne	4	103	412
1862	Rhine bridge near Mayence	4	105	420
1879	Rhine bridge near Coblentz	2	106	212
1862	Rhine bridge near Mayence	4	105	

Year of opening	Name of bridge	Number of openings	Span metres	Total length
1890	Bridge over the Emperor William Canal near Gruenthal	1	165.5	156-5
1893	Fordon bridge near Thorn	13 5	61·2 98·5	1,288-1
1894 1897	Bridge over the Emperor William Canal near Levensau Wuppertal bridge near Mueng-	1	163.4	163.4
	sten	1 1	170	170
1902	Rhine bridge near Worms	2 1	102·2 116·8	321.2

There were 557 tunnels, with a length of 197.533 kms; of which 47.383 kms were single track, and 150.150 kms double track.

Broad-footed rails were generally used for the tracks of normal gauge lines; only 136.63 kms (1898: 546.66 kms) having chair rails. The total length of track amounted to 95,705.96 kms (1898: 86,269.5 kms), 69,656.46 kms being "through" track. About 7 per cent of the latter consists of welded iron, or welded iron with steel heads, 67,241.41 kms of the through track rested on single chairs (wooden or iron cross-sleepers and stone cubes). There are on an average 1,240 wooden, 1,263 iron cross-sleepers and 1,663 stone cubes to each kilometer of track. 2,168.46 kms rested on longitudinal sleepers (Hilf system, &c.); 109.96 kms directly on the ballast bed (Hartwig system, &c.). In 1898 these figures were as follows: 62,262.65 kms, 3,019.98 kms and 134.61 kms, bearing evidence in favour of single chairs. The joint of rails is generally effected where single chairs are used by suspended joints.

The weight of the rails of 4,776.32 kms track, amounted to 30 kgs, of 40,419.08 kms track, amounted to 30-35 kgs, of 15,743.72 kms track, amounted to 35-40 kgs, of 5,858.27 kms track, amounted to 40-45 kgs, of 444.02 kms track, amounted to more than 45 kgs.

There were 174,826 switches in use, (reducing the triple and English switches to single switches) 2,083 of which were worked on the track; 778 sliding platforms, 2,121 locomotive turn-tables, 2,150 car turn-tables and 5,380 centesimal scales. 13 works were engaged in soaking and impregnating sleepers. 5,029 fixed and travelling cranes, and 40 shears were employed in hoisting loads. 2,925 water stations with 7,092 water pillars furnished the water required. There were 10,445 stopping places and railway stations. 307 sheds were used for sheltering, cleansing and overhauling cars, and 2119 sheds with 14,750 stands were provided for locomotives. 559 sheds were situated quite close to the water stations.

The signal and communication department employed:

	1901	1898				
Torse apparatuses Other apparatuses	25,880 907 23,479 38,077 15,082 46,609	13,508	Increase "	**	11	79

6,909 wheel keys which prevented by electrical means the highest rate of velocity prescribed being exceeded were employed in controlling 5,548 kms of track where trains had to run cautiously. The proper intervals between trains were secured by means of 3,125 block stations. On lines where many trains run (metropolitan lines, &c.), electric block signals announcing the approach and departure of trains (blocks with four fields) were employed. Furthermore, the signals are frequently connected with rail contacts, closing the track at the rear until a train has passed the signal. Efforts have been made to attain greater security against accidents by increasing the number of distance telephones, thus facilitating the communications between block watchmen and station officials, by employing more advance signals, (in 1898 there was one advance signal to every 2.74 signals, in 1901 one to every 2.52), by quarding trains halting on the open track by means of detonators, and by flag and torch signals. Constant progress in this direction is being made by means of extensive improvements in the mechanical and electrical closing of switches and signals. There were 5,984 signal boxes, mostly towers, for signal, switch and closing apparatuses, affording a clear view of the permanent way.

The cost of maintaining, renewing and supplementing the permanent way, superstructures, telegraph and signal contrivances, buildings, improvements and removal of snow amounted to 235,536,303 marks (1898: 198,302,692 marks) viz. 4,645 marks for every kilometer, 301 marks for 1,000 locomotive kms, and 13 marks for 1,000 car kms.

In March 1902, the rolling stock of the German railways consisted of 19,724 locomotives, 13,827 tenders (in 1899: 12,702), 41 motor cars (in 1899: 26), 39,878 passenger cars (in 1899: 35,062), and 419,990 luggage and freight cars (in 1899: 383,576). The number of locomotives during the past years was as follows: In 1846: 1, 1851: 10, 1860: 180, 1870: 1,414, 1880: 6,253, 1890: 11,304, 1900: 19,069, only 420 of which were built abroad. In 1900, 1,236 locomotives were added to the stock.

The following table gives information concerning the construction of the rolling stock.

c .			- 4 4		
LΩ	co	m	OU	ves	_

Style of locomotive	Un-	2	3	4	5	Total
Style of focomotive	coupled axles		Couple	d axles		amount
Locomotives with extra tender for passenger and express trains	9	5,609	157	_		5,775
Locomotives with extra tender for freight trains Tank locomotives for		371	6,827	950	5	8,153
passenger train service Cank locomotives for freight train service Cank locomotives for		2,324	3,361	62	49	5,796
shunting	9	8,304	10,345	1,012	54	19,724

A large number of passenger and freight locomotives are constructed according to the compound system, which is extensively in use at the present time. In order to satisfy the demands for velocity and working capacity, the locomotives have been provided with greater heating surface and constructed heavier, so that at the present time double-coupled passenger and express locomotives, with bogies or adjustable axles, and for certain parts of the lines freight locomotives with five axles are at work. The average weight of the metropolitan locomotives, including tender, amounted to 44.6 tons. 10,568 of the above-mentioned locomotives (in 1899: 8,663) are provided with continuous brakes; 7,233 (in 1899: 5,200) have wheel brakes. 25 of the aforesaid 41 motor waggons are driven by electricity and 16 by steam or combustion motors. The use of cars with combustion motors on secondary lines, is increasing.

During the last few years experiments have been made on the Prussian State Railways with superheated steam, and 70 superheating locomotives were employed for this purpose.

Passenger Cars. 1901.

	ntrance the	Total number		Provide	d with		Total Actua weight		
		of	2	3	4	5	number of	1 axle	1 place
front	side	cars		axl	es	axles		tons	
				Actual r	number				
16,396	25,521	39,917	26,917	10,382	2,609	9	95,470	5.58	0.29
				189	8				
12,975	22,111	35,086	25,347	8,488	1,247	4	81,170	5.34	0.28

	P	assenger Cars. 19	01.	
Brake a	ppliances pro	vided for		us brake provided for
7	axles		Apparatuses	Conduct only
Passenger cars	in general	per cent of axles	Number of waggon axl	
		Actual number		
33,214	74,453	78	70,114	15,771
		1898		
27,640	61,241	75.5	57,009	15,216

- The style and equipment of passenger waggons have likewise undergone a remarkable transformation during the last few years. In order to attain very regular, easy motion, the cars were increased in length and provided with double axle bogies. Sleeping-cars have been constructed with triple axle bogies. Numerous trains, especially the so-called through trains (D-trains) are provided with dining compartments for the convenience of travellers; sleeping accommodation has also been enlarged and improved.
- The International Sleeping-car Company of Brussels has furthermore introduced so-called "trains de luxe," which enable travellers, in addition to other comforts, to make long journeys without changing, at the highest possible speed: i. e. St. Petersburg-Berlin-Ostende, Paris-Vienna-Budapest-Constantinople, &c. &c. The trains are only composed of first class cars, and an extra charge of 2.3 to 4.5 pf. per kilometer is made for travelling by them.
- Passenger trains are lighted with a mixture of oil, gas and acetylene gas. Detailed experiments on a large scale are being made with numerous systems of electricity in lighting single cars and entire trains. The trains are generally heated by steam, sleeping and saloon cars by hot water. On several lines passenger cars are heated with pressed charcoal or by the Swiss hot air system; fourth-class waggons contain stoves.

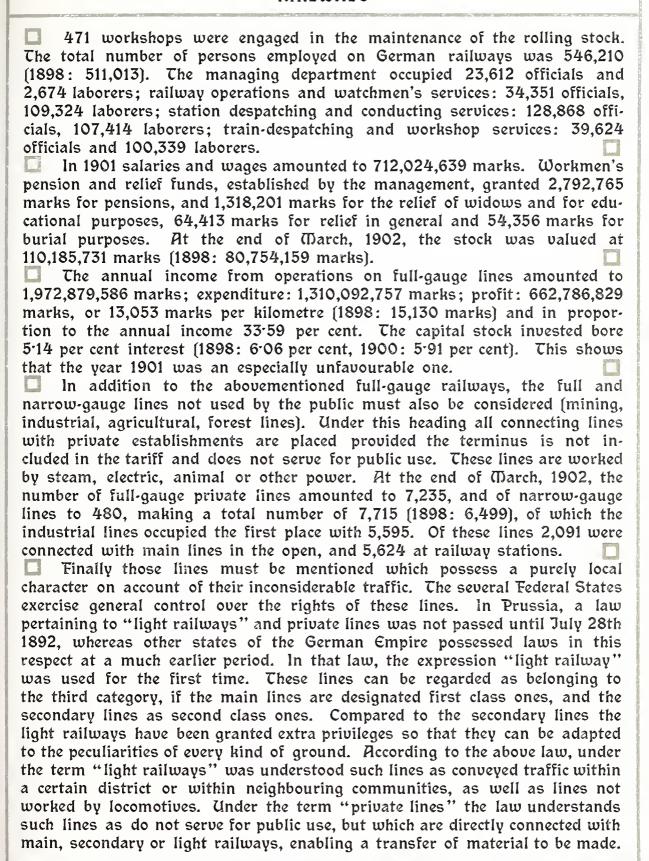
Luggage and Freight Cars. 1901.

		Number	1	Actual weight			
Style of car	Number of cars	2	3	4	Number of axles		ad on
Style of cat	of cats		axles		or unics	1 axle	
		Actua	al numb	er		to	ns
Luggage cars	9,884 (8,664)	7,614 (6,919)	2,182 (1,658)	88 (87)	22,126 (19,160)	4·96 (4·85)	2·42 (2·39)
Covered freight cars	122,059	120,886	978 (854)	196 (273)	245,488 (229,726)	4·03 (3·86)	6·07 (5·75)
Open freight cars	288,049 (260,751)	281,114 (254,602)	2,810 (2,661)	4,125 (3,488)	587,174 (531,153)	3·35 (3·25)	6·21 (6·01)
Total	419,992 (383,578)	409,614 (374,557)	5,970 (5,173)	4,409 (3,848)	854,788 (780,039)	3·59 (3·47)	6·07 (5·84)

Luqqage and Freight Cars. 1901.

	Bral	ke appliance	s on	n Continuous b					
Style of car		Axles		appliances on					
Style of cat	Cars	in general	per cent	Apparatuses	Conduct only				
		of axles		of axles		of axles Number		Number of	car axles
Total	143,154 (127,327)	290,659 (258,046)	34·00 (33·08)	23,835 (18,681)	10,770 (8,741)				

- The figures in parenthesis refer to 1898. The increased demands on freight cars corresponds to the increase in weight of load. The employment of four-axled luggage cars on express trains increases steadily. The number of postal cars amounted to 2,315 with 6,555 axles (as compared to 2,122 with 5,889 axles in 1898). 876,340,193 passengers were conveyed (1898: 763,048,450); 0.37 per cent in the 1st class (1898: 0.36 per cent), 8.95 per cent in the 2nd class (1898: 9.27 per cent), 55.76 per cent in the 3rd class (1898: 60.41 per cent), 33.25 per cent in the 4th class (1898: 28.37 per cent) and 1.67 per cent military persons; 942,636 tons luggage and 1,714,394 dogs. 20,600,806,229 passenger-kms were run. Each person was conveyed on an average: 23.5 kms. 352,536,405 tons of freight of all kinds were transported (1898: 321,960,842 tons); 35,340,713,249 ton-kms were run. Each ton was trans-
- ported on an average 100.25 kms. Each freight car axle, in loaded condition, carried on an average 2.77 tons.
- The chief articles of transport were: Coal, brick coal and coke; about 92,250,000 tons, Bricks and building materials 22,600,000 tons, Brown Coal 22,229,000 tons, Wood 14,130,000 tons, Earth, clay, &c. 10,528,000 tons, Grain and cereals 9,740,000 tons, Iron ore 9,857,000 tons, Beets 9,038,000 tons, fertilisers, manure 7,196,000 tons.
- The amount expended on rolling stock was as follows: Locomotives and tenders 874,943,000 marks, motor cars 1,113,000 marks, passenger cars 412,707,000 marks, freight and luggage cars 1,212,315,000 marks, total amount 2,501,078,000 marks.
- The total amount expended for maintaining and renewing the rolling stock was 185,541,049 marks (1898: 161,804,073 marks), or, 4,848 marks for each locomotive, 332 marks for each passenger car axle, and 69 marks for each luggage or freight car axle.
- The working capacity of the rolling stock was as follows:
- For locomotives, including shunting, service and empty runs, on an average 40,333 locomotive kms, or 26,798 kms with loads; for passenger cars, on an average, per axle, 45,155 car axle km, for luggage cars, on an average, per axle, 49,878 car axle km, for freight cars, on an average, per axle, 15,154 car axle km, all cars together 18,904 car axle km.



The rapid development of small lines in Prussia rendered it necessary to make another division. According to directions issued in August 1898, for carrying the "light railway" law into effect, a division into "metropolitan street railways" and "light railway lines resembling secondary railways was prescribed. The first class includes metropolitan street railways and such enterprises as resemble street railways in character, construction and management, in spite of their forming a connection between neighbouring localities, their principal aim being the conveyance of passengers. The second class includes those light railways which convey passengers and freight from place to place, and which in extent, plant and management resemble the secondary lines. The "Regulations for Light Railways" were passed almost simultaneously with these directions, and agree in the main with "Principles for the Construction and management of Local Railways," elaborated by the "Association of German Railway Administrations," but are in various points much stricter in character. Light railways as well as private lines may be of full gauge or of gauge measuring 1 m, 0.75 m or 0.6 m. In Germany full gauge and 1 m gauge are predominant. Gauge measuring 0.6 m is chiefly employed in districts possessing less capital, and for transportable field, forest and mining lines. Statistics covering light railways throughout the German Empire are not to hand. Only official statistics for Prussia have been compiled, containing also information of those lines holding first charters, as well as statistics of the "Association of German street and Light Railway Administrations." The latter only take into consideration those lines which are in active work; these statistics have however been considerably added to recently, and a combination of both is under consideration those lines which are in active work; these statistics have however been considerably added to recently, and a combination of both is under consideration. The following items have been t
a) Passenger traffic in cities
jointly

Rolling stock employed: Steam locomotives on 18 lines, or 12.7 per cent Electric motors
The number of steam locomotives used was 74, passenger cars 10,057, freight cars 882. A steady progress in the employment of power has been noticeable mostly at the expense of horse power. 16,164 officials and 7,379 regular laborers were occupied, of which the Berlin street railways alone employed 5,874 officials or 36·3 per cent, and 1,786 laborers or 24·2 per cent. In Prussia, 799,949,842 persons were conveyed and 726,139 tons of freight transported (in all Germany 1,191,457,092 persons and 971,377 tons of freight). The total number of persons conveyed is equal to 20 times the population of the empire, and in Prussia alone equal to 23 times the population. Light railways resembling secondary railways: number of lines 215; lenght of lines 6,847·0 kms (5,711 kms). This shows an increase of 9·8 per cent compared with the foregoing year. The gauge on 41·3 per cent of them is 1·435 m; on 24·4 per cent, 1 m; and on 17·4 per cent, 0·75 m. Lines with full gauge are steadily increasing. The following were in operation: a) for passenger traffic in cities and suburbs 4 lines 55·6 kms, b) for traffic otherwise than in cities (bathing resorts) 5 lines 57·9 kms, c) for trade and industry 64 lines 1,061·1 kms, d) for agriculture 107 lines 4,626·8 kms, e) for trade, industry, and agriculture conjointly 33 lines 1,046·5 kms. The lines employed for agricultural purposes have increased in one year by 60·7 per cent. The rolling stock comprised the following: steam locomotives on 196 lines (92 per cent), electricity on 13 lines (6·1 per cent), steam locomotives and horses on 1 line (0·5 per cent). There were 725 steam locomotives and horses on 1 line (0·5 per cent). There were 725 steam locomotives and horses on 1 line (0·5 per cent). There were 725 steam locomotives and horses on 1 line (0·5 per cent). There were 725 steam locomotives and horses on 1 line (0·5 per cent). There were 725 steam locomotives and horses on 1 line (0·5 per cent). There were 725 steam locomotives and horses on 1 line (0·5 per cent). There were 725 s
Fritz Herr.





limate and quality of soil are the two most important factors which determine the agricultural condition of a country; where these two factors manifest the greatest possible variety, as is the case in Germany, a corresponding variety may be expected in the nature of the agricultural pursuits followed and in the agricultural products found throughout the country.

The German Empire, situated in the colder temperate zone and extending from the high level of the Alps to the low country lying about the North Sea and the Baltic, possesses a climate influenced by the Atlantic Ocean, but at the same time presenting so many various aspects that it not only affects the fertility of the soil in the several districts differently but also necessitates different methods of husbandry and cultivation.

The coldest districts are those in the east of the Baltic, the wooded mountain district of the Hartz, the Swabian and Bavarian Plateaus and the Alpine region which extends throughout Bavaria, Wurtemberg and Hohenzollern. There the spring can scarcely be said to commence before April, while the early coming winter nips all vegetation on field and meadow. Consequently only a short period of growth can be counted upon, during which the hot summer days permit the fruits of the earth to ripen rapidly, while, on the other hand, the long hard winter often endangers the autumn sown corn. In Silesia, on the contrary, which lies in the centre of the Empire, and in Thuringia and Saxony, milder temperature brings the buds out in March, while the Rhine Province, Rheingau and the valley of the Rhine are among the warmest regions. There the vineyards ripen in glorious sunshine.

The rainfall is subject to considerable variation, but is generally sufficient to assure a prosperous growth of vegetation. The rainfall varies in the different districts throughout the year between 400 and 1,720 mms, and between May and September, during which time a constant and regular supply is of such great importance, and after the winter's moisture has been absorbed from the soil, it varies between 248 and 830 mms. Accordingly we find certain districts in which the most delicate plants flourish, whilst in other districts the cultivation of summer crops is endangered owing to want of sufficient moisture. Another peculiar characteristic is that in many extensive districts of Germany

the comparatively heavy rainfall during July and August renders harvesting difficult, which is not the case in many countries. The distribution of atmospheric precipitations over the whole Empire is such that the central and eastern regions are the driest, while the Baltic region is the most favourable for agriculture and the southern mountain district has the greatest atmospheric precipitation. Besides the varieties of climatic conditions, we find even greater differences in the nature of the soil and in its productivity. In contrast to the great low-level plain of North Germany, which is traversed here and there by low ranges of hills, the low-level plain of the upper Rhine between the Vosqes mountains and the Black Forest, and the tertiary valleys between the Danube and the Alps in the south, we also have a multiplicity of mountainous formations of the most varied geological origin. In the plains we have an alternation between the alluvial soils, sometimes found as extensive moorland and sometimes as fruitful marshland and flats, and the dialluvial soils which appear in the form either of erratic loam, clay or sand, in continous surfaces—which whilst resembling each other on the whole, yet show considerable variations—sometimes of fruitful soil, sometimes medium, and sometimes also the most barren, unfruitful soil. The mountainous districts of Germany on the other hand consist for the most part of disintegrated soil which has been deposited upon the original rock. The kinds of soil vary accordingly as the rock from which they are derived was colored sand-stone, shell-lime, marls, silurian, chalk, gneis, miczous schist or argillite. Here and there are also found eruptive formations such as basalt, porphyry, and granite. Taken as a whole Germany is a land of agricultural contrasts caused by its natural conditions. There are grassy plains and grassy highlands; fruitful, wheat growing valleys and bare sandy plateaus; "golden pasture lands," "fertile plains" and gloomy forests; high and low-lying moorland, and wooded mountains of a hundred different shades. According to the census taken in 1895, the population of Germany numbered 51,770,284 persons, from among which number the proportion of persons with families and servants engaged in agricultural pursuits (including gardening, stock-breeding, forestry and fishing) was 18,501,307, or 35.7 per cent of the total population. These figures put the agricultural population on about the same level with the industrial population, since the numbers engaged in mining and smelting, in manufactures and the building trade amounted to 20,253,241. The number of persons engaged in trade and commerce and the remaining free occupations is far smaller than those employed in agriculture, for the number of persons earning a livelihood in trade and commerce, with their families and servants, was only 5,966,846, and those following the other free professions and occupations, together with the persons having no stated occupation, numbered only 7,048,890. The percentage of the agricultural population as compared with the total population varies very considerably in different districts of Germany. In some localities the proportion rises as high as 600 per 1,000 persons, as for in-

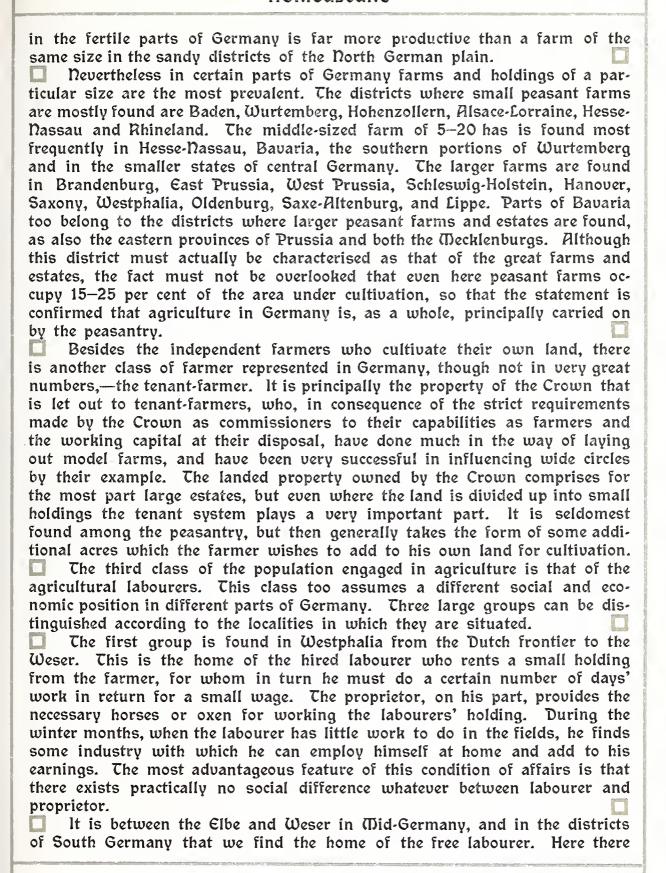
stance in the eastern provinces of Prussia; whilst in the centre of the Empire and in the industrial districts to the west it falls in places to 100 and less. Thus whilst the agricultural population preponderates in some parts of the Empire, in other parts we find a mostly industrial population. Taken as a whole, however, agriculture continues to be one of the most important factors in the total industrial life of the population of the German Empire, although the character of the state cannot be regarded as being, on the whole, an agricultural one.

The agricultural population itself is divided into large estate owners, or small farmers and agricultural labourers. An absolutely accurate division into classes cannot, however, be made, since some persons occupy an intermediate position between estate owner and farmer and between farmer and agricultural labourers. The social and economic division of the independent land owners and farmers (i. e. estate owners, tenant farmers, and the large and small peasantry) as distinguished from the agricultural labourers, is represented by the following table, which gives the figures for Germany in 1895.

Holdings, Farms or Estates	Number		Area in hectares	
moranigo, carmo or oscaros		per cent		per cent
a) Small holdings, with less than 2 has of land b) Small peasant farms, with	3,236,367	58-22	2,415,914	5-59
2–5 has of land	1,016,318	18.29	4,142,071	9.57
5–20 has	998,804 281,767	18·00 5·07	12,537,660 13,157,201	28·96 30·39
e) Farms and estates with, 100 acres of land and over	25,061	0.50	11,031,869	25.49
Total	5,558,317	100	43,284,742	100

This summary shows that agriculture in Germany is principally in the hands of the peasantry. It contradicts an opinion which has been often asserted, that Germany is the historic land of the large estate owner. For although the small holdings of less than 2 has are more numerous than the farms of 2–100 has of land, yet the farms held by the peasantry form 69 per cent of the total area under cultivation, while the large estates only amount to 25.5 per cent, and the small holdings to 5.5 per cent.

In view of the varying conditions of climate and fertility already depicted, and the consequent difference in profitableness of working the various farms and holdings, it is of course natural that the economic importance of the different divisions (according to size) should vary very considerably. The productivity of a middle-sized peasants farm of 20 has in the east may be very different from the productivity of the same sized farm in the most fertile parts of Saxony, Hessen, or Rhineland, and in the same manner a farm of 200 has



are single estates lying between distant villages. The villagers themselves, the owners of small holdings, the cottars, the tenant farmers and peasants who one and all form part of the community, are in this case the persons who supply the necessary hands to work the estate. Here, however, it is not the work upon the land but the actual possession thereof which forms the basis of these persons' existence. As regards their social position they are just as firmly established in their home as the labourers in Westphalia. But the labour which they are able to contribute to the estate owners in districts where agricultural pursuits are much followed is no longer sufficient, and here too we find that the itinerant labourer has made his way just as in many places east of the Elbe.

Finally in the eastern provinces we have either to deal with districts where the frequency of the villages makes the population dense and consequently offers the necessary supply of labour (in some instances more than is required), or else we find districts of large properties or manors, as in Mecklenburg, and Uckermark, Pomerania, West Prussia, Posen and East Prussia. Here the prevailing system for the labouring classes is a sort of bondage. The land owner makes sure of having the necessary labour for a given period of time by means of a contract which covers not only one man but his whole family. The family is established in the cottages which stand upon the estate, and must work for the owner of the estate. The work is paid partly by time and partly by piece. In addition to this the labourer receives ploughland and pasturage from the estate to enable him to support himself and feed his cattle. He has no land of his own. Being entirely dependent on his employer his position is not one to command great respect in the community, and he has consequently not many ties to bind him to his home. He becomes unsettled and moves from place to place,—often into the towns, which offer the attractions of higher wages and more amusement. This has given rise to rural depopulation in the east, which finds but a weak compensation in the immigration of itinerant Poles and Russians. And this practice of moving about is perpetually on the increase, so that now a movement en masse from east to west takes place every spring, while in the autumn the people flock back again.

The efforts which are being made to improve the conditions of agricultural labour in the eastern districts are accordingly directed to retaining labourers in the country by securing small plot holdings for them and giving them small establishments. Attempts are being made as well as by the State to cope with the scarcity of labour in this manner by private societies and land owners.

Great as are the differences in climate and productivity of the soil in the several regions of the German Empire, we find just as great a variety existing in the nature of the several agricultural occupations; districts where the farmer is chiefly occupied with the raising of cereals—in some cases even to such an extent that it is carried on entirely without stock—are varied by others whose rich meadows and pasture lands naturally favour stock breeding.

But in many places we find both equally represented. This may be owing to the fact that advantages for both are offered by the natural conditions, and that the land is equally divided between ploughland and meadow; or it may be due to a better soil and damp climate which make the land more suitable for the cultivation of fodder, or that the establishment of distilleries and the cultivation of sugar beets and sugar-making provides rich food-stuffs for stock. The proportion which the above named branches of industry bear to each other in Germany at the present day is as follows: ploughland and marketgarden, exclusive of such used for the cultivation of fodder, pasturage, sugar beets and potatoes, covers an area of 18,846,800 has, or 53.8 per cent of the whole area under cultivation. Meadow land in Germany covers 5,956,200 has or 17 per cent, rich pasturage 795,100 has or 2.3 per cent, poorer pasturage (Hutungen) 1,911,600 has, or 5.4 per cent, vineyards 135,200 has, or 0.4 per cent, fodder crops 2,656,700 has, or 7.6 per cent. cultivated pasture 1,051,100 has, or 3 per cent, sugar beets 460,900 has or 1.3 per cent, and potatoes 3,241,800 has or 9.2 per cent. The establishment of the above mentioned technical by-industries has had a great deal of influence upon the nature of the separate agricultural pursuits. Where sugar-making is carried on, the whole industry of the neighbourhood is engaged in the cultivation of sugar beets. Where sugar beets are grown, we find that a deep turning of the soil has been introduced, that it is carefully worked with ridge drills and hoeing machines, and that artificial manures are much more freely used. The breeding of draft and other cattle, too, is influenced to some extent by the growing of sugar beets. The more thorough working of the ground requires heavier draft horses or oxen, and at the same time, in consequence of the abundance of richer food, more attention is given to dairy farming and stock fattening. Distilling and the manufacture of starch, which depends upon the cultivation of potatoes, have an effect upon agricultural pursuits similar to that of the sugar industry: in the latter case the produce necessitates hoeing and a very thorough working of the ground. The distilling industry certainly tends principally to retard the cultivation of valuable food-stuffs in farming, but the commercial value won by introducing these by-industries is of very considerable importance, since the annual value of the sugar produced amounts to 351 million marks, of spirits to 197 million marks, and of starch to 72 million marks. Owing to the difference in climate and productivity of the soil we do not find large districts in Germany where one or the other system of farming is carried on exclusively. There are however small localities where the conditions are sufficiently constant to cause some particular branch of farming to be the prevailing one. The provinces of Erfurt, and Cologne, for example, and the principality of Schwarzburg-Sondershausen may be pointed out as dis-

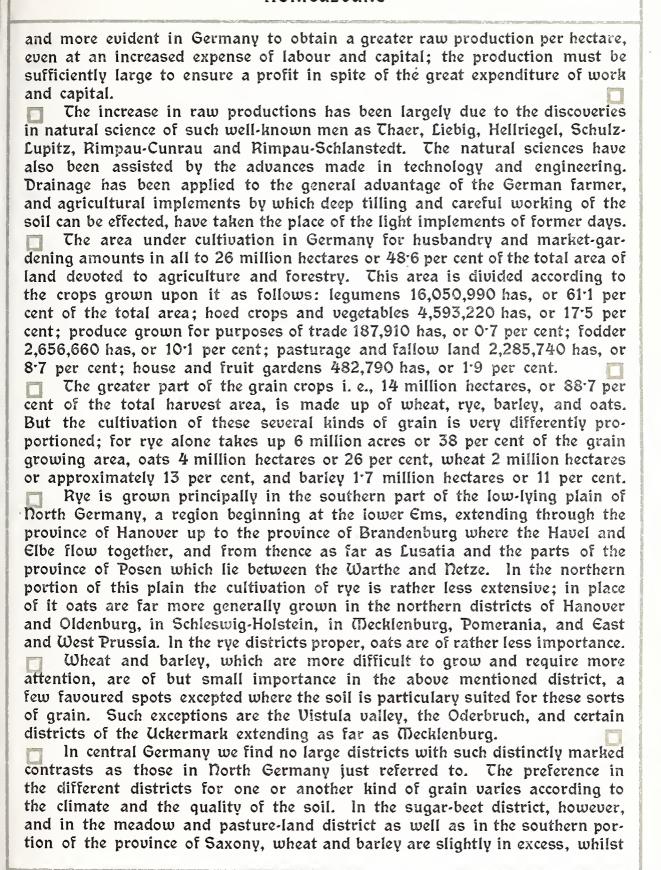
tricts in which husbandry pure and simple predominates, while on the contrary the marsh districts in the province of Schleswig, parts of the province of Stade, the Duchy of Oldenburg, and, in Southern Germany, Bavaria and the province of Freiburg are particularly favourable to stock-grazing on account of their extensive meadows and pasture lands. For districts where fodder and food-stuffs are the chief agricultural products, the province Rhenish Hesse and the district of Chemnitz may be cited, the Duchy of Brunswick and the province of Merseburg for the cultivation of sugar beets and for potato growing, and for distilling purposes among other places the government circuit of Frankfort-on-the-Oder.

The form of husbandry most generally practised in Germany at the present day is that of the simple or modified rotation of crops, but where particularly favourable conditions of soil exist, we find a free method of cultivation without a regular rotation. In both systems a similar aim is followed, to obtain the greatest possible quantity of raw products by using and maintaining the natural qualities of the soil appropriately by means of increased tillage by machinery or hand, and by expending considerable sums upon manuring the fields.

Stock-breeding in Germany is in reality dependent upon the smaller farms, these being engaged in every branch of stock-breeding. There are at the same time remarkable differences in the groups of farms (grouped according to size) as far as advantageous stock-breeding is concerned. Horse-breeding for example grows relatively with the size of the farm, for it is found principally among the larger of these farms. Sheep are mostly bred on large estates, whilst on the other hand small farms in Germany breed more swine and horned cattle than large estates, though naturally the latter take a considerable part in breeding. Finally comes goat breeding, which is only of general importance for quite small farms.

The actual centers of cattle-breeding are the pasture and moor-land farms. The former are most frequently found in the marsh-lands of the Baltic region, in the valleys of the larger rivers, and in the mountain districts of Germany. The moor-land farms are principally situated in the districts of North Germany which are favoured by sea coast climate. In both kinds of farms fat stock-vaising and dairy-farming are carried on; their principal occupation, however, is the rearing of stock. Those farms where the fodder required for the stock is obtained from tilled land, or where the existence of technical by-industries causes a particularly valuable supply of food-stuff, are not so well adapted for stock-rearing as for stock-fattening and dairy-farming, which consequently form the chief occupation.

The agricultural industry of Germany has from time immemorial been based upon husbandry, and the latter therefore plays the most important part at the present day in the agricultural activity of the nation. In spite of this, however, Germany does not provide sufficient corn for her own population, but considerable quantities of wheat, rye, barley and oats are imported annually from abroad. The effect of this inrush of foreign grown grain upon German agriculture has been to considerably reduce the price of corn in Germany during the past half century. In order, therefore, to gain any profit at all in spite of the low prices, the endeavour is becoming more



in the higher lying districts, such as the Hartz and Weser highlands, oats
and rye are more common.
In South Germany on the other hand, in Wurtemberg, to the West of
Bavaria, rye is little cultivated, while to the east of Bavaria it is more general
again. In place of rye we find in the first named districts that special pre-
ference is shown to spelt, barley and oats. Certain parts of Alsace-Lorraine
again are eminently wheat-growing districts, and the Grand Duchy of Hesse
is noted particularly for barley. In certain districts of the Rhine valley, how-
ever, rye is grown to a greater extent than in the neighbouring regions.
Such is the varied distribution of these four principal kinds of grain in Ger-
many, according as the climate and soil favours specially the one or the other.
But it is not alone the relative area under cultivation which determines the im-
portance of any particular grain in a country's husbandry, but the amounts obtainable from the different areas under cultivation.
lt is difficult to imagine greater differences in this respect than those
found throughout Germany. The lucrativeness of growing oats, for instance,
depends very considerably upon whether the particular districts planted are
situated in the really barren highlands of Germany or in the fruitful plains
and valleys. In the same way the advisability of sowing rye depends on
whether it is to grow on the barren hill districts of the North German
plain, in the sandy tracts of the Mark, or in the highly cultivated and fertile
districts of the Magdeburg lowlands.
Throughout the Empire the average annual harvests per hectare during
the last four years have been as follows: wheat 18.50, rye 14.60, spring-
barley 18.25, oats 17.10 d.z.*)
The smallest harvests gathered were:—wheat 14.2 d.z., in Wurtemberg,
rye 11.5 d.z., in West Prussia, spring-barley 14.3 d.z., in Westphalia, and oats
13.4 d.z., in Hohenzollern. The heaviest harvests noted were:—wheat 25.8 d.z.,
in Anhalt and Schleswig-Holstein; rye 21.2 d.z., in Schaumburg-Lippe; barley 24.2 d.z., in Anhalt, and oats 23 d.z. in Brunswick.
The total average harvests for the last four years amounts to 3,521,965
tons of wheat, 8,720,840 tons of rye, 3,101,847 tons of summer barley and
7,098,080 tons of oats.
Amongst other cereals, legumens are still more extensively cultivated,
and occupy roughly 11/2 million hectares, or 11 per cent of the area devoted
to the growing of grain. These take an important position in the rotation
of crops owing to their property of enriching the soil by being collectors of
nitrogen. They are grown sometimes by themselves, or occasionally mixed
with other cereals. They are sometimes grown for obtaining seed or green
fodder, sometimes for ploughing into the ground as manure. This latter is
done principally with lupines.
[Amongst the group of hoed crops and vegetables which occupies 4.6 mil-
lion hectares or 17.5 per cent, the lead is taken by potatoes with 3.2 million
hectares. Then come beets for fodder with roughly 500,000 has and sugar
*) 1 Doppelzentner (d.z.) is about 2 cwt.

beets with 476,000 has, 15,700 has of this area being employed for seeding. A further area of about 300,000 has is devoted to various kinds of turnips and beets for fodder purposes, tops and wild cabbage. We also find here and there in Germany cultivated fields of vegetables, such as cucumbers, onions, asparagus, horse-radish and various sorts of cabbage. Amongst crops grown for trade purposes we find the cultivation of rape seed and colza, hops, tobacco and chicory. This branch of crop cultivation is not very extensive and is only of local importance. Finally fodder-growing such as the clovers, grasses—sometimes mixed with clover—lucerne and serradella, occupies 2.6 million hectares or 10 per cent of the arable land. Besides this there are about a million hectares of pasturage devoted to the growing of fodder for cattle. The development of German stock-breeding has followed the course which appeared likely to produce the greatest possible amount of profit. Just as during the last ten years Germany has been becoming less and less a purely agricultural country and has gained more and more in industrial importance, this course of development has been taken into account by the agricultural population engaged in the breeding of stock. The idea was formerly cherished that stock-breeding was a necessary evil indispensable for obtaining the manure required for husbandry, and the profit which the farmer made from the sale of cattle and animal products was of but secondary importance. To-day other views prevail. For while the prices obtained for the products of the earth have been constantly decreasing, the prices given for all animal products, with the exception of wool, have remained firm. This is owing to the greater demand for food by the constantly increasing well-to-do industrial classes, and to the difficulty of transporting such products in Germany. And if a reason for the increase of attention now paid to stock-breeding is to be found in the above mentioned decrease in prices, another good reason exists in the technical progress which has been made in the study of cattle rearing and feeding which has led to the possibility of raising the value of an estate by stock-breeding, thus rendering the employment more general and popular. Under these conditions stock-breeding in Germany has developed to a great extent, as can be gathered from the following statistics. At the present time there are in Germany: 4,195,361 horses, valued at 2,352,063,600 marks; 18,939,692 horned cattle, valued at 4,182,248,200 marks; 9,692,501 sheep, valued at 194,812,200 marks; 16,807,014 pigs, valued at 913,712,800 marks and 3,266,997 goats, valued at 54,565,000 marks. Horse-breeding has been developed in Germany in two directions. The breeding of blood-horses for saddle and carriage has occupied a place of importance now for many years. The principal center of this branch of horsebreeding is in the North German plain. The Kingdom of Bavaria, however, also breeds principally blood-horses, though of heavier type than the North German breeds. Besides these districts, we also find the blood-breeds in parts

of Baden, the Grand Duchy of Hesse and the Province Hesse-Nassau. In North

Germany, the Trakehnen breed in East Prussia, and the Celle provincial stud in Hanover especially deserve to be mentioned. More recent breeds are those of Oldenburg, Schleswig-Holstein and East Frisia. The breeding of shire-horses, and heavy draught horses, is of considerably more recent origin in Germany. It is carried on principally in the Rhine Province, in Westphalia, Thuringen, the Province of Saxony, the Kingdom of Saxony, the Grand Duchy of Hesse, in Wurtemberg and Alsace-Lorraine. The sires and dams kept here belong to the Rhenish Belgian breed, the Clydesdales, Shires and Percherons.

The breeding of horned cattle is the most important of all breeding occupations as far as the number and value of the beasts is concerned. The breed itself has also considerably improved in consequence of the rise in the demand.

In parts of the North German plain, where at one time one used to see herds of cattle with black and brown, red and gray beasts mixed all together, we find to-day uniform lowland breeds. These are either breed for milking purposes, such as the Angler, North Schleswig, red East Frisian, colored Westphalian and Oldenburg highland breeds, or they may be breeds noted both for being good milkers and for fattening well, such as the colored East Frisian, the Breitenburg and black and red lowland breeds of East and West Prussia, of the Warthe and Netzebruch districts, of the Altmark, Posen, Lüneburg and of the lower Rhine valley; or, again, they may be breeds whose good fattening is of more importance than their being good milkers, as, for instance the Weser valley breed and the reddish Holstein moorland breed. About 55 per cent of all the horned cattle in Germany are comprised under these breeds, the other 45 per cent being made up by the Hohen breed, which is found in Middle and South Germany. The most important branch of the Hohen cattle is the large spotted Simmentaler breed, which is noted for its famous fattening qualities; it produces good draft-oxen at the same time, whilst its milking properties are of secondary importance. This breed alone makes up 36.4 per cent of the Hohen cattle. A good milking breed amongst these latter is found in the grayish-brown highland cattle and those of the Vosges mountain districts. Besides these the provincial cattle of upper and lower Bavaria, the Franken, the Pinzgauer and the Glan-Donnersberg cattle are typical representatives of the Hohen breed in South Germany, whilst the breeds of the Vosqes mountains, Siegerland, Westerwald, Wittgenstein and the Hartz, are found in the highlands of middle Germany, though they have only quite a local importance as compared with the first named breeds.

Sheep-farming is the only branch of stock-breeding which has fallen off in Germany during the last ten years, and this in spite of the fact that it was once most flourishing in this country, and very profitable. Its decline was due to the competition of wool from foreign lands beyond the seas, for the flooding of the European markets with colonial wool reduced the price in Germany to such an extent that sheep-farming was no longer profitable. Moreover the intense activity of farming at the present day helped to spoil the industry. The falling off has not only been in numbers but also in breed.

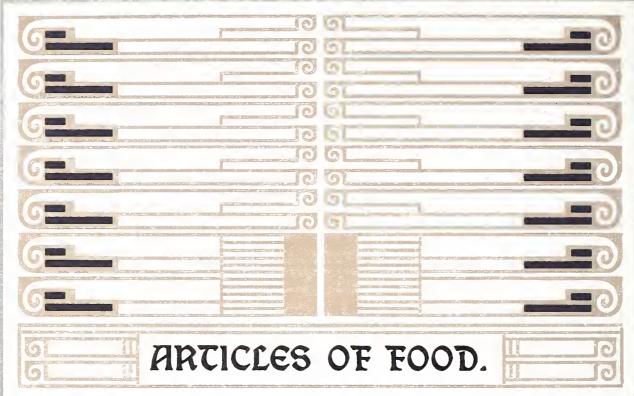
At one time the production of fine and extra fine wools was widely spread, but at the present day more attention is paid to fattening, through which of course the fineness of the wool has had to suffer. The production of good worsted wools, however, has not suffered to the same extent. An important part too is played by the sheep found in central and southern Germany, whilst the better class sheep-farming, both for fat stock and for wool, belongs principally to the east. A peculiarly typical form of sheep-breeding is furnished by the wandering herds of Wurtemberg. In the breeding of pigs we find a greater increase than in all other branches of stock-breeding. Not only has it doubled during the last ten years both in value and in numbers, but the growth in both respects has been more rapid than that of the population. Pig-breeding is directly connected with cattle--breeding, as it utilizes waste dairy material, and consequently prospers in proportion. In addition to this it is the cheap kind of pork that is demanded by the great mass of the population, and owing to the great rapidity with which pigs breed, pig farmers are easily able to meet all demands. Besides the increase in numbers the great advance in pig-breeding has been accompanied by an improvement in breed owing to the importation of early bearing English sows, particularly the large white Yorkshire sow. The black Berkshire pig has played a less important part in German breeding. But the efforts of pig-breeders are directed not so much towards spreading a pure English breed of pigs throughout Germany as towards procuring with the help of the English breeds an improved German breed of pigs, which is likely to prove especially useful under the conditions which exist in Germany. Finally goat-breeding has also experienced an increase as well as an improvement, partly under the influence of the breed introduced from Switzerland, and partly in consequence of an improvement in the national breeds. The development of farming during the 19th century shows signs of an unusual perfecting of technology in every direction. The increase in the population rendered a very considerable increase in the production of food-stuffs necessary if Germany was not to become too dependent upon foreign imports. At the same time, however, the prices to be obtained for agriculture products were going steadily down, so that it was only possible to increase the production provided that it grew more rapidly than the increased amount of capital and labour spent upon it. This, however, could only be effected by perfecting the technology of agriculture. Consequently, we find a more thorough and careful tilling and working of the ground, a proper amount of manuring combined with a suitable rotation of crops, a proportionate breeding of cattle and rational feeding of useful stock accompanied by a greater extension of technical by-industries practised to-day than was formerly the case. These are the factors which have led to an improvement in agricultural production. Although the results which natural science has attained in the course of the 19th century have laid the foundations of this progress, it has been

first and foremost the public measures and the associated enterprises that were undertaken at the same time which have been responsible for these scientific discoveries being put into actual practice and turned to account. A hundred years ago the agriculture of Germany was subject to such restrictions that progress was scarcely possible. It was only the legislation of the first half of the 19th century, which by doing away with peasant service and dues, the pasture rights upon other persons' land, the confusion of plot holdings and the system of compulsory meadows, opened the way to improvements in farming and husbandry. It was not until the free peasant could employ his whole time in farming his own ground by aid of the knowledge obtained from external sources that he was able to carry on his work practically. But provisions have been made by the establishment founded by the state for agricultural instruction to assist the farmer in obtaining the knowledge necessary for practical farming. In this connection we may mention the founding of agricultural faculties at universities and agricultural colleges, of schools of husbandry and winter schools, the engaging of itinerant lecturers on agriculture and special branches connected with it, such as dairy instructors, stock-breeding and fruit-growing instructors, itinerant teachers from associations, and, finally, the establishment of experimental farms. The perfecting of technology in agriculture would not however have been possible under present financial conditions if the agricultural credit-advancing system had not proportionately increased. Splendid results have been attained by the provincial banks and the loan establishments connected with them, as well as by those banks, provincial credit banks and credit banks and credit-advancing institutions established by the state, by provinces or by united communities. Last but not least, the agricultural societies and associations have exerted their influence to assist the advancement in technology. The farmer's home and sphere of work is naturally the open country, and he is consequently from the very beginning separated to a certain extent from the centres of social life and from his companions in the same profession. But when the farmer came to recognize the fact that he must remain in touch with the centre of all scientific and economic life in order to have a share in the progress made, he found that farmers' societies or associations were the means by which to attain his object, and consequently we find throughout Germany a great number of local societies, branch societies, circuit and district societies which form the basis of the farmers' associations. These are connected one with another by central societies, chief and provincial societies in the separate provinces and small states. These central societies in most parts of the German Empire are now being replaced by legally incorporated Chambers of Agriculture, find in their turn a common union in the general representative bodies of the individual states, viz., in Prussia the College of National Economics, in Bavaria the Board of Agriculture, in Saxony the National Board of Husbandry, in Wurtemberg the Central Office of Agriculture, and finally the German Board of Agriculture for the whole Empire.

- If these bodies are rather of an official character, there are also large associations which are entirely of a private nature, such as the Farmers' Union, whose aims are principally of a political nature, and, for special branch interests, the associations of distillers and sugar beet growers, the society of German hop growers and many others. The most important association of this kind, and the one which has made it its object to further the technology of agriculture in every branch, is the German Agricultural Association founded in 1884 on the lines of the Royal Agricultural Society of England. Its founder was the well known engineer (Dax von Eyth, and it numbers at present 14,000 members from all parts of Germany. It is strongly supported financially both by the voluntary subscriptions of the members and by the surplus profits from its own undertakings. Its aim is to further the technology of agriculture by means of annual Agricultural Exhibitions held in different places, which have won the recognition due to them at home and abroad, and by means of meetings held thrice annually at which the public is informed of the work that is being done for the improvement of husbandry, the theory of manuring, seed-culture, stock-breeding, cattle-feeding, agricultural machinery, fruit and vine-growing, building and architecture, the theory of farming and of the cultivation of the soil.
- Side by side with the Agricultural Societies we find the Farmers' Co-operative Associations. In the middle of last century Schulze-Delitzsch and Raiffeisen started the movements which have spread so widely and generally throughout the whole of Germany, particularly during the last ten years. The most important factors are the savings and loan banks. Besides these we have the Central Credit Association and Central Association Fund. The associations of agriculturists transact the sale of requisites such as strengthening fodder, artificial manures, cabbages, machinery, &c. The farmers' Supply and Demand Associations attend to the disposal of and the demand for agricultural products. The most important are the Milk Associations, which have of late been assisted in many of the larger towns by associated societies founded by the dairy-farmers for the sale of milk, &c. Besides these there are a large number of associations which attend to the disposal and sale of fruit and vegetables of every kind. During recent years Silo Associations for the sale of grain have sprung into existence, as well as associations for the sale of spirits; this latter includes by far the larger proportion of potato-spirit producers. Besides smaller associations for the sale of stock we also find slaughter-house associations, which are, however, only of local importance. There is in addition the Central Cattle Association, the object of which is to regulate and organise the cattle trade of Germany.



ARTICLES OF FOOD





he last few decades have wrought great changes in the domain which concerns itself with the food of nations, and especially in that of the German people. The preparation of raw materials and of wholly or partly manufactured articles, which was formerly carried on in single families or by small tradesmen, has been gradually absorbed by large manufactories or whole-

sale industries, a movement which displays a marked feature of the new conditions, in tending to establish new standards for food stuffs.

In consequence of the extended means of communication, many German territories which had hitherto been shut off from traffic, have been brought into touch with the markets of the world, and channels have been opened for the increase of their manufactures and consumption.

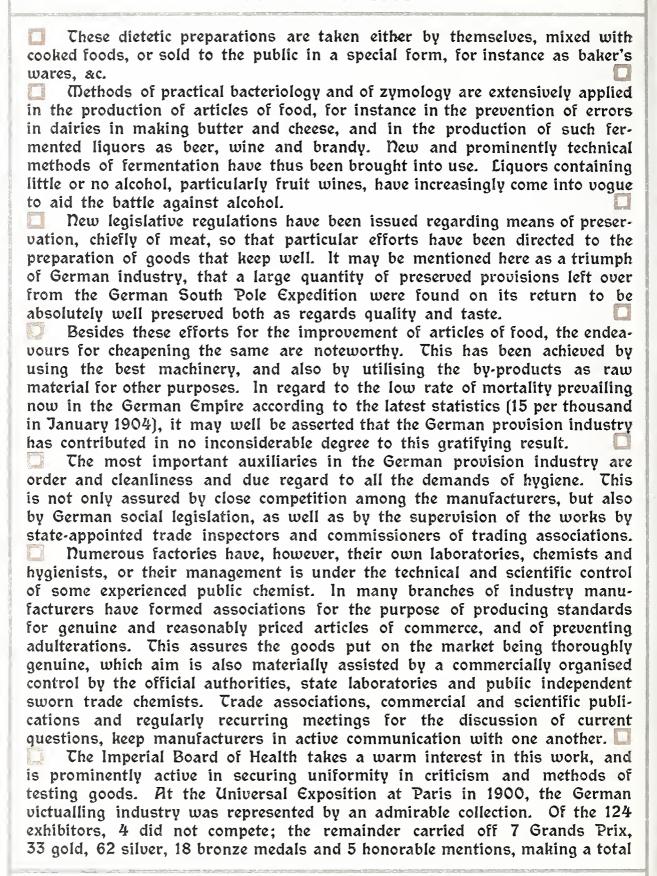
To this may be added the increasing demands for victualling the army and navy, as well as traffic with the colonies and distant lands. The extent and universally recognised prominence of the great German shipping companies have also had a twofold effect in stirring the home industries into activity, for not only have they brought suitable raw materials to Germany's doors, but the requirements of foreign countries with regard to taste, packing and external finish have been made distinctly evident.

Social legislation has raised the general conditions of life among the German people, and thus among the broad masses of the population the desire to make use of formerly quite unknown articles of food and luxury has asserted itself, or to provide substitutes where means have not sufficed to procure these.

ARTICLES OF FOOD

- Pettenkofer, Voit, Rubner and other German scientists have tried by comprehensive studies to solve the problems of dietetics and metabolism, and their discoveries have opened new outlets for German industry. Men like Liebig, Koch, Soxhlet, Aubry, Vogel, Delbrück, Wortmann and their co-workers have not only created new principles, new methods and new preparations, but have also relegated antiquated views to the back-ground, replacing them by new ones. Seel, von Buchka, König, Hilger, Fresenius, Forster, Kayser and others have improved the methods of research, organised the supervision of markets, moderated extravagance betimes and shown industry the way which it must earnestly strive to follow in order to advance with success.
- And thus from natural necessity a mighty impulse has been directly given to the German provision industry by the consolidation of technical methods and contrivances for making manufactured articles tasteful, and by the reformation of the process of manufacture itself in accordance with the principles of hygiene.
- Germany is partly indebted for this progress to the many societies in manufacturing circles, such as the "German Agricultural Society," the "Association of German Unitners," the "Association of German Brewers," the "Association of German Butchers," the "Association of German Chocolate Manufacturers," the "Association of German Pastrycooks," the "Union of German Provision Merchants and Dealers," &c. It has been recognised that a mixture of the mostly unsurpassed native raw products with foreign wares is in many cases advisable in order to produce a savoury and nourishing article. Various ways have been tried to improve the quality of the latter; one has been to deprive the materials of some of their less valuable ingredients by refining; another has been to add well known substances containing a high proportion of fat or nitrogen to the aforesaid materials in accordance with the rules of rational dietetics, and a third, to produce delicious and entirely new foods.
- Particular attention has been paid to the nourishment of children, the sick and convalescents, not only by the perfecting of contrivances for sterilizing and pasteurizing, as also by the process invented for rendering milk free from germs by filtration, but also in adding quite new dietetic preparations to the old infants', babies', and starch foods. The scientific investigation and rational methods of producing these is a specially German feature, and this branch of German industry has attained a particularly high stage of development. Among others Tropon, Somatose, Sanatogen, Nutrose, Plasmon, Eukasin, Roborat, and preparations of gluten are great articles of commerce to-day. They are mostly produced from animal or vegetable albumen, and many millions of capital are invested in their manufacture. These preparations contain albumen in sometimes an already partially digested state. sometimes in an easily soluble combination, or already mixed with other substances, so that doctors not only have a large number of such preparations at their disposal, but numerous ways are opened up by which the social economist and friend of the people can improve the food of the masses.

ARTICLES OF FOOD



of 125 awards. Since then the German nation has had to pass through a short but severe commercial crisis. The greatest attention must be paid during such periods to improving the methods of manufacture in order to keep pace with foreign competition; in this way the German provision industry has made advances, and stands to-day like a sturdy tree fraught with sprouting buds in the centre of the economical development of the German people.

The German provision industry studies the wishes of its customers with regard to packing as far as possible. Stimulated by former success and animated by an earnest desire to improve still further, it has taken absolute purity, perfect cleanliness in working, and attention to all the requirements of hygiene and dietetics as guiding principles, and by these means may be confident of maintaining an honorable position in friendly competition with other nations in the markets of the world.

H. Becker.



WINE CULTURE, THE WINE TRADE, AND THE MANUFACTURE OF SPARKLING WINES.



ine culture in the German Empire is of very great politiceconomical importance in spite of the fact that only one 450th of the total area of the country is used for this purpose, and the further circumstance that it lies very near the northern limit of the growth of the vine. This is best seen by making a comparison with other wine-

producing countries. Although from the point of area devoted to wine-growing Germany ranks no higher than tenth in the list, the money value of its output brings it nevertheless to the fourth place on account of the remarkably excellent quality of the wines from certain parts of the country in good years. The following table shows this very clearly.

	Area in hectares devoted to wine-growing	Yearly average yield in hectoliters Millions	Value in marks (Dillions	
Italy	186,000 137,000 125,000 119,000	30·7 30·5 29·0 5·0 3·7 1·0 10·0 2·5 2·0 2·6 1·9 1·2 0·6 2·1	614·0 490·0 493·0 120·0 46·5 20·0 ? 19·0 36·8 125·0 ? 26·2 ?	

This good result is due, as is more clearly shown later on, to the production in certain districts in favourable years of extremely fine wines, which are marketed at the highest prices and cannot be surpassed.

Germany has been far more successful than other European wine-growing countries in fighting against the ravages of phylloxera. The method used is one of extermination. Every vineyard is thoroughly inspected, and all vines found to be infected with phylloxera are destroyed together with those in the immediate neighbourhood, the area thus disinfected not being cultivated for vines for several years. The primary object of this is to confine the evil to such narrow limits that wine cultivation can be afterwards carried on in the old approved manner. This purpose has been accomplished. From 1874 the presence of phylloxera in vine-nurseries, gardens, &c., has been recognised. Its first appearance in the wine-growing districts was on the Ahr in 1881, and it was subsequently discovered in the different wine regions of Prussia, Bavaria, Wurtemberg, Hesse, the Thuringian states, and Alsace-Corraine. Between 1874 and 1898 a total of about 360 hs was subjected to this exterminatory treatment, that is to say 0.27 per cent of the total wine-growing area has suffered. The cost of this treatment has been 7.5 million marks during twenty-five years, but this seemingly large amount is only 0.23 per cent of the value of the vintages during the same period. Thanks to the vigorous measures taken, German vines have not suffered from phylloxera since. In spite of this favorable result no efforts will be spared in testing all such methods, either of the culture or treatment of varieties of vine not subject to

WINE CULTURE

phylloxera, which can serve to the future progress of vine culture so that the extermination of vines need not be resorted to.

According to the statistics of 1893 the total area of the German Empire covered with vines was 135,210 hs. The areas under cultivation and their yearly yield for the period 1883/1902 are shown in the following table:

Year	Area under cultivation in hectares	Vintage in hectoliters	Year	Area under cultivation in hectares	Vintage in hectoliters	
1902 1901	119,922 119,560	2,475,699	1892 1891	118,292 119,294	1,673,626 748,462	
1900 1899	119,249 117,284		1890 1889	120,300 120,935	2,974,593 2,021,569	
1898 1897	117,279	1,406,818 2,775,643	1888 1887	120,588	2,859,998 2,392,042	
1896 1895	116,405 116,137	5,050,874 2,011,637	1886 1885	120,301	1,503,072 3,727,366	
1894 1893	116,548	2,824,422 3,820,352	1884	119,974	3,358,017 3,195,967	

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Circumstances affecting the wine culture and wines of the various districts.

On account of variations in the weather, both the quantity and the quality of the vintages vary very greatly in different years; this holds good not only for the various districts, but also for the different localities in each. Owing to these climatic

variations, good wine years are not very numerous: the best during the past century were 1802, 1804, 1807, 1811, 1815, 1819, 1822, 1825, 1827, 1834, 1835, 1842, 1846, 1848, 1857, 1858, 1859, 1861, 1862, 1865, 1868, 1874, 1875, 1884, 1886, 1889, 1893, 1895, 1897 and 1900, but these dates do not hold good equally for all districts. The better the quality of the wine, the smaller the yield. Reckoning on the basis of the best quality, one hectare with 14-16,000 vines produces 48 hls of wine per year. In the different wine-growing districts throughout the country, the greatest care is taken when gathering the crop, to separate the grapes according to their quality especially on the larger estates; in this way an excellent vintage is obtained in those years which produce only an average quality of wine. The chief wine-countries of Germany are those in the western provinces, the principal districts being in the neighbourhood of the Rhine and its tributaries. In the northern districts are hill and mountain slopes with southern exposures, which from the favorable conditions of their soil and climate are particularly adapted to the cultivation of the Riesling vine. It is believed that this variety originally grew as wild stock in the valley of the Rhine or of one of its tributaries. In addition to other splendid qualities, it possesses a remarkably fine and charac-

teristic "bouquet," and this too in spite of the various methods of cultivation. It has brought world-wide fame to the German wines, and is to be found at its very best only in the vintages of the chief wine-growing provinces of Germany. The Riesling wine of other countries can scarcely be recognised as a product of the same variety of vine. Climatic and geological conditions alone are not responsible for this difference: to the shaping hand of Nature is added the intelligent observation of the cultivator, and only through the harmonious blending of these two factors can the highest results be obtained. In the chief wine-growing districts of Germany not only is the vine cultivated and tended during the whole year with a solicitude rarely found elsewhere, but in order to obtain the very best material possible the grapes are gathered with a care and punctuality quite unusual in the vinevards of other countries. Here a further element enters into consideration, the skillfulness only gained by experience in carrying out all those wonderful transformations which the grape juice undergoes during and after the process of fermentation in order to bring out to the fullest extent all the valuable properties which mark the finished product.

Germany produces mostly white wines, for which grapes from the Riesling, Sylvaner, Traminer and Gutedel vines are used. Red wines are not made largely, except in some parts of Baden and in the Metzer district.

In point of simple area, the

Wine culture of Prussia

ranks only third among the wine-growing states of the German Empire, 18,316 hs being covered with vines; but in point of the excellent qualities yielded by several of its districts, it is entitled to the first place. The Prussian government owns an area of more than 200 hs,—a larger extent than is owned by any other state of the German Empire. Of these 200 hs, about 100 lie in the Wiesbaden district, the remainder, not yet fully laid out, in that of Trêves. The entire tract is most favorably situated, and may be considered the most valuable wine estate in the world. In 1902 the vineries of Prussia were distributed among the several provinces as follows: Hesse-Nassau (including the Rheingau) 3,196 hs, Rhineland (including the districts of the Mosel, Saar, Nahe, Ahr and the valleys of the Rhine and its chief tributaries) 12,562 hs, Saxony 732 hs, Silesia 1,273 hs, Posen 130 hs, and Brandenburg 372 hs. From the point of view of the wine-trade, only the first two are of real importance.

The Rheingau, lying along the right bank of the Rhine between Schierstein and Caub, holds the first place in the whole world for the value of the wines it produces. The best vintages have lately brought prices never reached before in the open market. The prices per butt (1,200 liters) of 1893 vintage were as follows: Eltville 30,000 marks, Erbach 38,000, Geisenheim 14,020, Hallgarten 15,700, Hattenheim 35,140, Johannisberg 24,020, Kiedrich 20,200, Mittelheim 13,800, Rauenthal 17,100, Rüdesheim 24,000, and Winkel 15,280 marks. To the Rheingau wines belong also those of Hoch-

heim, a small town lying further up the Rhine, close to its confluence with the Main: the familiar term "Hock," an abbreviation of "Hochheimer," is used in England and America to denote all Rheingau wines. In 1893 Hochheimer reached its highest price, 22,060 marks per butt: for the earlier years the following maximum prices per butt are worthy of notice; for the vintage of 1868 in Rauenthal 17,143 marks, Erbach 17,314, and Kiedrich 25,020; for the vintage of 1884 in Erbach 23,980, and Hattenheim 33,460 marks. The highest offers for that of 1895 were, in Erbach 7,340, in Geisenheim 6,000, Hattenheim 9,080, Johannisberg 10,140, and Rüdesheim 7,200:—those for 1897, in Hattenheim 14,640, Rüdesheim 15,080, and Winkel 13,920 marks. The Rheingau wines are characterised by their delicateness and pleasant fruity taste, their generous but mild quality, their richness in body, and their fine bouquet. The diversity which they show in one and the same year delights every connoisseur. Assmannshausen produces the best German red wine from the late-ripening Burgundy grape, which in good years is equal to the best French claret. It is therefore quite easy to understand that in this beautiful district, so richly endowed by nature, the vineyards command very high prices, ranging from 96-120,000 marks per hectare. Based upon an average price from 8-10,000 marks per hectare, the wine-growing area of this small district, 2,315 hs in all, represents a value of from 17 to 20 million marks. In certain parts its wine-growing area has of late increased.

- There the Riesling vine thrives on gently sloping hills and the terraced mountain sides in soils of argillaceous slaty character, or of "Cyrenen" marl. In good years 70-80,000 hls of wine are produced, with an average value of from eight to ten million marks. Frankfort-on-the-Main, Mayence, Bingen, Coblenz and Cologne have for many years been important centers of trade for the Rheingau wines. This trade has greatly increased during the past few years, and is even now constantly increasing. Its principal centers are in Rüdesheim, Hochheim, Geisenheim, Oestrich-Winkel, Johannisberg, Eltville, Wiesbaden, and Lorch.
- In the Rhineland district of Coblenz, the wine-area under cultivation amounts to 8,424 hs, and that in the Trêves district is 3,963 hs. These districts are remarkable for the extraordinary growth of the Riesling vine in the slaty soil of the Moselle and Saar provinces. This wine is characterised by its pale colour, its lightness, delicacy and freshness, its pronounced bouquet and aromatic flavour, the latter in its better qualities surpassing all other German wines. The market for these wines, as also the price, has greatly increased on account of the development of these specialities. For the same reasons the cultivated area has also been greatly extended, many woodlands having been cleared and laid out as vineyards where the soil was favorable. The average yield of these two districts amounted to 266,986 hls, valued at twelve million marks.
- A good idea of the prevailing popularity of Moselle and Saar wines can be obtained from the prices paid for Trêves wines. This is shown by the following figures, in which the net proceeds of each "fuder" (975 liters) are

given. In 1893 Grünhäuser held the first place with 12,750 marks, Piesporter 9,060 marks, Geisberger 8,020 marks, and Scharzhofberger 7,970 marks. In 1895 Scharzhofberger led with 7,050 marks, Bocksteiner following with 7,000 marks. In 1897 Zeltinger heads the list with 9,070 marks, followed by Grünhäuser with 8,610 marks, Piesporter with 8,500 marks, Scharzhofberger with 7,970 marks, and Bernkasteler with 7,530 marks. The total amount of the Trêves sales for the following vintages are of interest.

	Number of "fuder"s	Total value in marks	Average price per "fuder," in marks
1893	1,567.5	5,004,250	3,195
1895	1,012	2,842,300	2,809
1897	816.5	2,786,020	3,412

- The last vintage considerably exceeded the average prices, not on account of the quality of the wines, but because the number of markets had considerably increased. The chief vineyards lie along the middle part of the Moselle from Trêves to Cochem, and are not only the largest in area, but produce the finest varieties. Other Moselle wines worthy of notice are Josefshöfer, Graacher, Ohligsberger, Karthäuserhofberger and Caseler: somewhat inferior are the Uerziger, Erdener, Kinheimer, Trarbacher, Trabener, Wintricher, Throner, Cueser, Lieserer, Niederemmeler, Winninger, &c. and of the Saar wines the Oberemmeler, Wawerner, Kanzemer, Ayler, &c. The most important centers of the wine trade on the Moselle are Trarbach, Traben, Trêves, Mühlheim, Bernkastel, and Dusemond; of those on the Rhine Coblenz and Cologne are the most noteworthy.
- Wine-growing in the river district of the Nahe is quite an important occupation. In the neighbourhood of Kreuznach, the wine-growing area of which has of late considerably increased, the average yield for the years 1893—1898 was 59,670 hls, valued at 1,715,164 marks. The principal vines grown here are the Riesling, Sylvaner, Ruländer, and Traminer; the soil is of gravel and slate with loam or heavy clay. The Nahe wines are partly full and juicy, partly thin, fine wines. Important centers of production are Kreuznach (with Kauzenberg), Roxheim, Niederhausen, Norheim, Münster, Laubenheim, Langenlonsheim, Monzingen, &c.; while Bingen and Kreuznach are the chief commercial centers for the trade in this wine.
- The best white wines of what is known as the Rhine valley are Bacharacher, Steeger, Manubacher, and Oberweseler; of the red wines those from Camp, Osterspai, and Hochheim, and, further down the Rhine, those of the Linzer region deserve mention.
- On the Ahr, far-famed red wines are produced, chiefly from the late Burgundy vine. The vineyards are mostly on slaty soils, cover an area of 840 hs, and are often laid out in artistic terraces. These wines have a fine aroma and a colour which is more or less beautiful; the chief of them are

from Walporzheim and Ahrweiler, both of which places are at the same time important commercial centers for the traffic.
Bavarian wine culture
covers an area of 25,000 hs, the average area actually under cultivation during the last twenty-five years being 22,189 hs, with a yield of 443,543 hls. In the Rhenish Palatinate, on the plains and sloping hills of the Haardt mountains, much wine is grown. The average yield of wine in the year 1902 on an area of 15,177 hs was 395,749 hls, valued at 11,278,846 marks.
Throughout the whole of the Rhenish Palatinate the successful results of the long continued efforts towards perfection in wine culture can easily be seen.
Fair wines are produced even in the most unfavorable years, while in good ones all kinds are produced, from the inferior qualities to those which cannot
be surpassed. The principal vines are the Riesling and the Traminer, which are planted in the best localities, the Sylvaner, the chief among white grape vines, and indeed the most largely planted vine in this section, the Ruländer
(locally called "Tokayer"), and the Gewürztraminer, this last a speciality of the Rhenish Palatinate. The principal wines produced are Forst, Deidesheim
and Ruppertsberg. The great value of these wines is shown by the amounts paid per thousand liters for the vintages of several years: that of Rupperts-
berg of 1893, for example, brought 12,030, Forst 17,000, and Deidesheim 17,200; of that of 1897, Ruppertsberg brought 7,700 and Forst 7,800. Indeed the 1875 and 1883 vintages of Forst wine brought 13,000, that
of 1889 brought 12,600, and Deidesheim of 1889 brought 11,710 marks. Far-famed wines of the midde Haardt mountains are produced in Wachen-
heim, Königsbach, Ungstein, Dürkheim, &c. In the lower Haardt mountains Kallstadt is the chief center, while the region lying between Neustadt and Lan- dau is noted for the production of large quantities of wine of medium and
inferior qualities. The chief centers of the wine trade in the Rhenish Palatinate are Neustadt, Deidesheim, Dürkheim and Landau: enormous quantities
are shipped from these places for export. The average yield for the last ten years in the Franconian wine district was 124,938 hls, valued at 3,598,947 marks, to which Lower Franconia with
an area of 6,407 hs marks a noteworthy contribution. White wines which have long been famous are produced in Würzburg, Randersacker, Hörstein,
Schloss Saaleck, &c. these are made chiefly from the grape of the Riesling vine. A form of wine-bottle known as "Bocksbeutel" is a peculiarity of
Franconia. Its wines are brought into trade chiefly from Würzburg, Kitzingen, Buchbrunn, Marktbreit and other towns, and are exported thence far and wide.
The Wine culture of Hesse
covers an area of 13,209 hs, of which 679 hs belong to the Bergstrasse, and 12,519 hs to Rhenish Hesse. The average yields of the period 1893/98 were,—270,239 hls in Rhenish Hesse, and 9,670 hls in the Bergstrasse with a yearly
average value of 8,898,000 respectively 337,000 marks. By far the greater part

of this district produces white wines from such vines as the Riesling, Sylvaner, and Ruländer vines, with the exception of Ingelheim and several places in its neighbourhood where a very fair red wine is made from the late Burgundy grape. Those wines which are made from the Riesling vine grown in the most favored parts of Rhenish Hesse are of extremely fine quality, aromatic, and rich in bouquet. The Sylvaner ripens earlier than the other vines mentioned above, which ensures a uniform quality in the vintages of different years. To this vine are ascribed the chief properties of the wines of Rhenish Hesse, as also its ability to produce a very fair wine even in unfavourable years. One of the very best of these wines is the fragrant "Scharlachberger" from the neighbourhood of Bingen. Next in order come those of Nackenheim, Nierstein, and Oppenheim, followed again by Laubenheim, Bodenheim and Büdesheim, these latter being the foremost among various other well known wine districts. The highest prices offered for each butt were: 1893 Scharlachberger 8,100 marks, 1893 Nackenheimer 10,040 marks, 1893 Niersteiner 13,660 marks, 1895 Scharlachberger 5,360 marks, 1895 Nackenheimer 4,000 marks, 1895 Niersteiner 8,000 marks, 1897 Scharlachberger 4,700 marks, 1897 Nackenheimer 13,000 marks, and 1897 Niersteiner 9,800 marks. The "Liebfraumilch" produced on a small area in the neighbourhood of Worms, is far famed for its delightful quality. Bensheim, Auerbach and Heppenheim produce the well known wines of the Bergstrasse. Mayence and Bingen are the chief commercial centers for the wine trade of Rhenish-Hesse, almost one-half of the amount handled being exported. Worms and Oppenheim also occupy important positions among the towns of the German wine trade. There is also a brisk trade in Bensheim and other towns of the Bergstrasse. Baden. In 1902 there were 17,684 hs under cultivation, producing 415,228 hls of wine at a value of 13,007,404 marks. But in certain years far more than a million hectoliters were produced, consisting partly of very good quality wines, and partly of very cheap white and red wines: the total yield for example in 1875 was 1,336,917 hls. The average production of the last ten years was 353,670 hls, valued at 11,386,300 marks. Of this amount 287,910 hls were white wine, 33,070 red wine, and 32,690 Schiller wine, valued respectively at 8,759,505, 1,473,570, and 1,153,230 marks. The vines chiefly used are the Gutedel, Riesling, Traminer, and Sylvaner for the white, and for the red the late Burgundy is the most conspicuous. The wine-growing area has decreased somewhat during the last ten years, particularly in the regions of the Main, the Tauber, and Lake Constance. The Kaiserstuhl, on the other hand, shows an increase: the very fiery wines of this district, grown upon basaltic soil, together with those of Markgräflerland, the Ortenauer and the Affenthaler red wines are famed far beyond the borders of their native land.

Wurtemberg,

with an area under cultivation of 16,826 hs, has during the last few years produced an annual average of 254,014 hls valued at 10,038,139 marks. Up to the present very little of this wine has been exported. The very marked decrease which former years have shown has in the last four years ammounted to only a very low percentage. More of the ordinary table wines are produced than fine wines, and more white than red and Schiller wines. The largest wine-growing area is the district of the middle and lower Neckar, the chief places being Cannstatt, Fellbach, Heilbronn, Lauffen, Neckarsulm, Stuttgart, and Weinsberg.

Alsace and Lorraine,

showed in 1902 an area of 31,138 hs actually under cultivation of which 10,971 hs lay in Upper and 14,360 hs in Lower Alsace, and 5,807 hs in Lorraine. The average yearly yield for the period 1893-98 was for Alsace 738.262 hls. value 18.151.211 marks—for Lorraine 173.438 hls. value 464.826 marks. In Alsace-Lorraine the average yield for 1875-97 was nearly one million hectoliters; the highest yield was in 1875 amounting to 2,059,293 hls—the lowest, in 1880, due to heavy frost, only came to 208,000 hls. For the socalled "noble vintages" the Riesling, Edler, Traminer, Klevner, and Muskateller vines are planted; for ordinary vintages, the Gutedel, Kniperle, Sylvaner, Elbling, Räuschling, Trollinger and Olwer. The best qualities of white wine are produced at Reichenweier, Rappoltsweiler, Heiligenstein, Wolxheim, Molsheim, Türkheim, Thann and other places, but these are very little exported. Delicious table wines are an important production of Alsace, and are to be found in great quantities and in numerous districts, the best of which lie along the mountain ridge from Thann to Marlenheim. The fine varieties of red wines, which are however only exceptional productions, come from Türkheim, Kaysersberg, Reichenweier, Rappoltsweiler, Rodern, St. Pilt, Ottrott, and St. Leonhard. Wine culture is far advanced in Alsace, but too little attention has hitherto been paid to the commercial side of the question and to the treatment of the wine: in the last ten years however, a noticeable improvement has been made in these respects. Lorraine produces chiefly red wines, especially table wines made from the Burgundy, Müller and Gamay vines. The white wines are made from Ruländer, Elbling, and occasionally, Riesling grapes. Practically all the wines of Lorraine are sold for local consumption, and in most years the supply is not equal to the local demand. A considerable quantity of grapes have been sent to the German manufactures of sparkling wines during the last twenty years, being well suited to this branch of the industry. It is estimated that about 25,000 hls are annually produced.

Kingdom of Saxony

has a wine area of 340 hs, and the

Of other German states, the

Thuringian States

a total of 194 hs. Their products however, are of quite minor importance.

The German Wine Trade.

NAME OF THE OWNER, OWNE

The German wine trade is in a very flourishing condition, and occupies quite an important position in the commerce of the world, its foreign markets having considerably increased of late years, as is shown by

the following statistics.

Imports and exports of new wines, dry and sparkling wines.

	Wine ar in ba		Wine in bottles		Sparkling wine			
Year	Quantity in double centners	Value in thousand marks	Quantity in double centners	Value in thousand marks	Quantity in double centners	Value in thousand marks		
	lmport							
1903	719,118	34,220	6,923	1,108	22,199	4,995		
1902	733,187	35,061	6,567	1,054	20,026	4,506		
1901	775,199	35,601	7,313	1,206	15,785	3,552		
1900	752,999	38,099	7,882	1,311	42,083	9,469		
1899	715,903	36,928	6,697	1,113	27,891	6,275		
1898	679,501	35,008	6,691	1,108	26,779	6,025		
1897	668,620	34,709	7,827	1,317	24,567	5,528		
1896	636,923	33,248	7,806	1,418	23,254	5,252		
1895	673,694	34,889	6,382	1,293	21,321	4,797		
1894	705,870	34,713	6,613	1,327	18,506	4,164		
1893	755,391	36,127	7,126	1,452	19,745	4,443		
1892	821,733	42,097	7,723	1,552	19,134	4,305		
1891	697,115	39,929	8,914	1,842	22,717	5,111		
1890	708,022	37,844	7,780	1,479	21,330	4,266		
1889	717,761	43,066	8,083	1,212	19,682	3,936		
1888	650,555	31,227	7,579	1,137	15,602	3,120		
1887	555,495	27,775	7,075	1,061	16,109	3,254		
1886	535,220	29,437	7,419	1,113	15,917	3,343		
1885	540,973	29,753	7,362	1,104	25,829	6,199		
1884	537,368	33,317	8,462	1,269	38,439	9,225		
Export								
1903	131,495	9,770	82,220	10,195	20,612	2,267		
1902	127,703	9,488	79,397	9,882	19,971	2,197		
1901	128,915	9,595	80,474	10,145	19,590	2,155		
1900	141,220	9,847	80,766	10,784	20,450	2,188		

wine culture

		Wine and cider in barrels		Wine in bottles		ng wine		
Year	Quantity in double centners	Value in thousand marks	Quantity in double centners	Value in thousand marks	Quantity in double centners	Value in thousand marks		
	Export							
1899	134,039	9,236	79,834	10,616	18,277	2,065		
1898	130,640	9,018	79,651	10,984	18,011	2,035		
1897	134,776	9,018	76,872	11,186	16,035	1,812		
1896	132,642	9,228	71,283	10,420	18,203	2,057		
1895	121,500	8,826	64,945	10,244	17,072	1,929		
1894	114,371	7,905	56,691	8,835	15,205	1,870		
1893	122,808	8,435	59,007	9,304	16,282	2,003		
1892	124,392	8,489	58,346	9,156	17,232	2,120		
1891	117,397	8,670	56,507	8,665	17,664	2,173		
1890	125,451	8,048	52,450	8,235	15,820	1,740		
1889	94,278	7,072	47,338	8,047	15,235	1,676		
1888	119,739	8,980	43,386	7,376	15,740	2,046		
1887	112,409	8,431	46,955	7,982	15,750	2,048		
1886	201,275	15,096	45,111	7,669	13,400	1,742		
1885	144,779	10,858	44,251	7,523	13,753	1,788		
1884	106,784	8,009	50,287	8,549	13,812	1,588		

Exports to the chief markets.

	1903	1902	1901
	Quantitie	s in double	centners
Wine and cider in barrels.			
United States of North America	38,872	35,166	35,510
Great Britain	21,814	22,547	22,118
Belgium	19,719	18,360	20,271
Switzerland	16,999	17,725	13,810
Holland	10,071	11,369	10,934
Russia	6,950	6,034	6,224
Austria-Hungary	4,066	3,433	3,628
France	3,862	4,023	5,946
Sweden	2,136	2,122	2,527
Denmark	1,699	1,604	2,194
Finland	1,538	1,439	1,906

	1903	1902	1901
	Quantitie	s in double	centners
Wine in bottles.			
Great Britain	23,783	24,036	23,146
United States of North America	22,911	21,501	19,369
Holland	8,308	8,057	8,311
Austria-Hungary	3,282	3,207	3,111
Free port of Hamburg	2,521	2,160	2,598
Belgium	2,377	2,224	2,409
France	2,030	1,796	1,597
Sweden	1,822	1,813	1,917
Russia	1,648	1,355	1,376
China	1,363	1,605	3,496
Sparkling wines.			
Great Britain	9,717	9,605	10,074
Belgium	2,358	1,672	1,500
United States of North America	1,621	1,693	1,392

The Manufacture of sparkling wine.

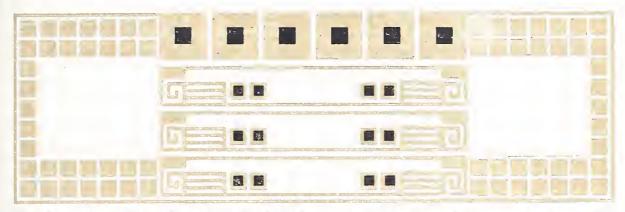
Beginning in the first third of the last century on a very small scale, the German manufacture of sparkling wines has developed in the following two-thirds most remarkably. The

method used is the same as that in Champagne—fermentation in the bottle. The total annual production amounted in 1840 to a quarter of a million bottles, in 1850 to a million and a quarter, in 1878 to four million, in 1886 to six million, and at present amounts to no less than ten million bottles. This increase grows larger yearly, for not only are the products sold in greater quantities for home use, but the export trade has also greatly increased. The sparkling wines which are most exported are those from the Rhine (Sparkling Hock), from the Moselle (Sparkling Moselle) and the sparkling wine made from various red wines of Germany. These are chiefly sent to Great Britain and the colonies.

The German sparkling wine industry is yearly making greater strides towards perfection in its products. It has brought itself to the front by the careful selection of different varieties of wine to suit the varying tastes of the consumers. The unwarranted prejudice which formerly existed against German sparkling wines has now almost entirely disappeared, and distinctions of various kinds have been showered upon them, especially by the committees of award at the largest world-expositions. Full honour was done them in 1867 at Paris; and in 1876 at Vienna the French themselves confessed

that several of the inferior German sparkling wines were better than the inferior French wines, while the better qualities were placed level with the best wines of France. They received also high praise at Sidney, Melbourne and Chicago. Sparkling wines are produced for the most part on the Rhine, the Main, and the Moselle.

H. W. Dahlen.



FORESTRY IN THE GERMAN EMPIRE.

1. Size and Distribution of Forests.



ermany has a forest area of 13,995,868.5 hs, comprising 25.89 per cent or a full quarter of the total area of the country, and in respect to afforestation stands above Norway (24 per cent), France (17 per cent), Spain (17 per cent), Belgium (13 per cent), Italy (12 per cent), the Netherlands (7 per cent), Denmark (6 per cent), Great Britain (4 per cent), but is exceeded

by Finland (56 per cent), Bosnia (53 per cent), Russia (37 per cent), Sweden (34 per cent), and Austria-Hungary (31 per cent).

The distribution of the forests varies on account of the natural conditions of climate and soil, and by artificial ones such as the development of economic conditions, laws and civilisation. From east to west, Germany lies wholly within the natural limits of timber-growth; in a direction running north and south only some few mountain chains rise above this. Conditions of soil permit the growth of trees everywhere. Even in the poorest positions, in the sandy parts of the plain and the shallow earth of the mountains, the hardier species of timber, especially fir and pine, find sufficient inducement to thrive. Thus in the course of centuries, the actual distribution is decided by artificial influences such as the density of population, the growth of property and legal relations, and the development of traffic. Afforestation is generally less in districts where the soil is more level and fertile and therefore devoted to agriculture, or where the population is denser and traffic more extensive.

Without regard to the political division of the Empire into 26 separate states, we may distinguish the north German plain district, or 49 per cent of the whole forest-area, with fir as the chief species of wood, the secondary

mountain and hill-country of central Germany with pine and beech predominating, 22 per cent of the forest-area, and the south German district with beech, pine and pitch-pine, 29 per cent of the forest-area. The afforestation of the separate states is given in the following table:

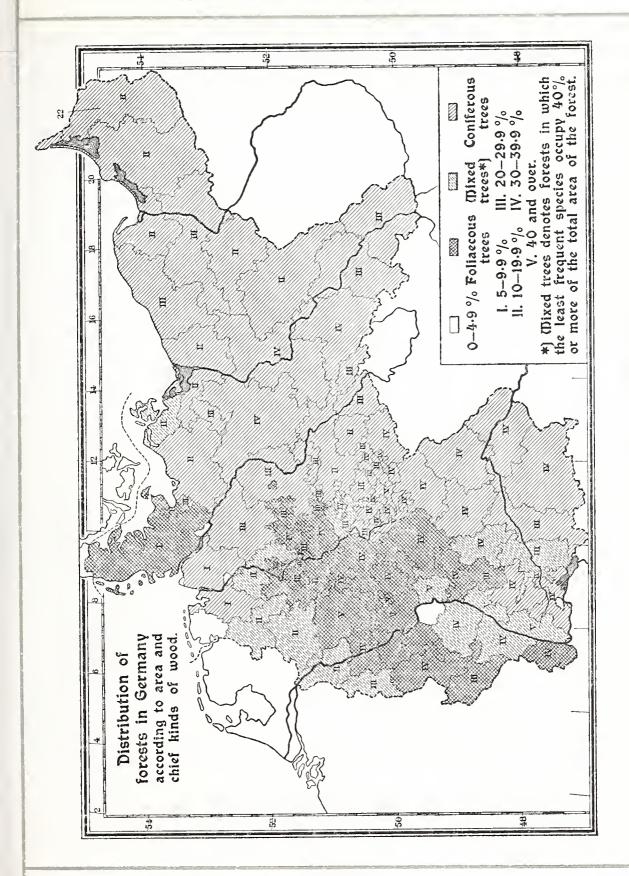
	NI-			
States	Total Area	Forest hs	Percentage of the Total Area	Per head of population hs
Prussia Bavaria Saxony Wurtemberg Baden Hesse Mecklenburg-Schwerin Mecklenburg-Strelitz Oldenburg Brunswick States of the Thuringian District The Smaller North-West German States Alsace-Lorraine	34,864,865·8 7,586,993·4 1,489,806·9 1,950,595·0 1,508,100·0 769,897·9 1,316,162·0 292,950·0 642,735·5 364,122·0 1,462,939·2 364,312·5 1,451,304·7	8,270,133·5 2,466,553·3 384,539·9 600,415·0 567,795·0 240,009·0 236,739·7 62,225·0 68,341·3 109,473·3 460,710·6 89,101·1 439,831·8	23·72 32·51 25·81 30·78 37·65 31·17 17·99 21·24 10·63 30·06 32·49 24·46 30·31	0·24 0·39 0·09 0·28 0·30 0·21 0·39 0·61 0·17 0·24 0·27
German Empire 1900 ,, ,, 1893 ,, ,, 1883 ,, ,, 1878	54,064,784-9	13,995,868·5 13,956,827·3 13,908,398·4 13,872,926·1	25·89 25·82 25·74 25·75	0·25 0·28 0·31 0·32

Arranged according to the three principal districts, the afforestation of north Germany is 21.37 per cent, of central Germany 31.89 per cent, and of south Germany 32.61 per cent.

Che whole forest-area in the German states is owned as follows: by the Ruling Houses 257,302 hs or 1.8 per cent, by the State 4,489,883 hs or 31.9 per

cent, by the communities 2,258,090 hs or 16·1 per cent, by Institutions 211,015 hs or 1·5 per cent (7·19 million hectares or 51 per cent is public property), by societies 306,214 hs or 2·2 per cent, property in trust 1,446,664 hs or 10·4 per cent (in tied but not public property 1·75 million hectares or 13 per cent), by independent private owners 5,056,701 hs or 36·1 per cent.

Carge estates surpass the total of the small in extent. They offer the greatest security for a systematic permanent revenue, especially when they take the form of trusts in the hands of public associations and legal representatives. 64 per cent of the forest is tied property, and 36 per cent un-



-fettered private property. For purposes of management the forest is divided into 953,875 units (enquiry of 1895), of which 22,041 are purely for afforest-ation and 931,834 in combination with agriculture. According to size the forests are divided as follows: on estates of under 10 hs 89.9 per cent or 11.8 per cent of the area; on estates from 10 to 200 hs 9.2 per cent or 19.7 per cent of the area; from 200 to 1,000 hs 0.7 per cent or 19.4 per cent of the area, 1,000 to 5,000 hs 0.2 per cent or 34.2 per cent of the area; over 5,000 hs 0.03 per cent or 14.9 per cent of the area. Thus 80 to 90 per cent of the total area is on a scale suitable for independent management. Most of the small estates are in west Germany.

3. Species of Wood large.
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(G) (G)

The variety of wood-species in Germany is not large. Among the numerous indigenous kinds which formerly existed, in consequence of the economic management of forests which was introduced in the middle of the eighteenth century, only those

have been preserved, which possess a high economic value, viz., of the foliage trees, chiefly oak and beech, over an area of 1 million hectares. in all of which however 0.45 million hectares are planted with bark-wood. This is most grown in the tall timber-woods and plantations on the lower Rhine and in Westphalia; its cultivation is declining, because the ground suitable for it is devoted more and more to agriculture, but it is grown abundantly in mixed woods along with fir and beech trees. Bark-wood is likewise declining in extent because it pays still worse on account of the low prices for tanning-bark. It is found chiefly in west and south Germany. The beech, (Fagus silvatica L.,) formerly much grown for fuel, has with the spread of coal-mining almost entirely lost its importance and is more and more displaced by the better paying conifer. It is most widespread in west Germany and in the chalk-ground of the south German mountains, and is moreover abundantly represented in the north, especially on the shores of the Baltic from Schleswig-Holstein to Pomerania. Wherever it is further cultivated on account of its good forest qualities, valuable species of wood, chiefly oak, but also maple, [Acer L.] and ash, [Fraxinus Tourn.] as well as conifers are grown along with it. In many places also horn-beam, (Carpinus L.,) elm, (Ulmus Tourn.) are planted with it, and such soft-woods, as aspen, poplar, (Populus L.,) and, more seldom, lime. The unpretending birch, (Betula L.) is seen everywhere. Finally the alder, (Alnus Courn.) is cultivated as underwood in damp low ground. The beech, including the hard-wood species of foliage-trees, covers about 2 million hectares, the soft wood 0.3 million hectares, the foliagetree mixed forest about 1.2 million hectares, and osier-beds 36,000 hs. The total area covered by foliage trees amount to 4.5 million hectares or 32.5 per cent of the whole forest area, 67.5 per cent or 9.5 million hectares, being covered with conifers. The most important species of the latter are the fir and pine, and in south west Germany the pitch-pine, mixed with larch. The fir, (Pinus sylvestris L.,) the chief species of wood in the sandy plain, covers 5.6 million hectares. It thrives best in the dry districts of north east Germany

(the East Prussian fir is highly valued) but flourishes also in those districts which have a considerable rainfall, i. e. in the west and on the plateaus of central Germany from Nuremberg to the Palatinate, and with careful treatment yields great quantities of wood, even in the hill and mountain country although generally of inferior value. According to the locality beech and oak, pine and larch, birch and soft woods are frequently grown with it. The pine, (Picea excelsa Ck...) forms the great forests which cover the mountains of middle and southern Germany, but from ancient times it has also been a native of the plains of East Prussia, Silesia, and Hanover. It covers 2.5 million hectares, and will continue to increase because it is hardy, easily cultivated, gives a high yield of timber in a relatively short time, and is therefore preferred in new afforestation and as a substitute for the economically inferior foliage-tree. The pitch-pine, [Abies pectinata DC.,] is usually grown in the Black Forest and the Vosqes, but occurs everywhere in mixed woods except in the north east. It occupies an area of 0.3 million hectares. The larch, (Lacix europaea Will.) is everywhere found mixed with the chief species of wood, mostly in the mountains where it is at its best.

Of the typical kinds of forestry, tall-timber predominates throughout; about 11 million hectares or 78.5 per cent are thus planted, 56 per cent with foliage trees, and 89 per cent with conifers. Bare clearing with artificial renewal is the general rule for fir and pine, seeding-in with natural renewal, for foliage-trees and pitch-pine. The cultivation of tall timber demands long periods of management, great areas of cultivation, systematic arrangement, and constant care, but yields most wood and is the most valuable per area. Low woods on the contrary cover only 1.4 million hectares or about 9.6 per cent. 7 per cent of foliage trees, and 11 per cent of conifers, and permit of the permanent cultivation of a small area, but yield less and less valuable wood, and are to be found in the small estates of Westphalia and the Rhine, and as far as conifers are concerned in the east. (Diddle-sized timber is still more sparsely represented as it amounts only to 5 per cent. The low wood occupies 6.8 per cent of the forest-area, and consists chiefly of 3.2 per cent of oak bark-wood in Westphalia and the Rhine provinces (34 per cent) but also in Bavaria, Baden, Hesse, and Hesse-Nassau. Moreover this form of cultivation is found everywhere, especially on independent small estates, in the east in fir forests as alders, in the west frequently intermingled with wood for agricultural use, as so-called hill felling-wood.



4. Timber Yields.

The yields are greatest in the tall timber woods, in conifer woods and in the state forests, smallest in the low woods and in independent private

forests. The total production will gradually increase because continued afforestation is taking place and the cultivation of tall conifers extending, and because at present younger trees are the most prevalent in the conifer high-wood, 48 per cent of the area being of under 40 years growth, 33 per cent from 41 to 80 years growth and 16 per cent over 80 years. In the foliage wood on the other hand these three grades are approximately equally divided.

- According to the statistics of 1900 the German forests produce annually about 20 million "fest-meter" [1 c.m. = 1 cubic metre solid wood] of timber, and 18 million c.m. of firewood, making a total of 38 million c.m. of solid wood (or wood of over 7 centimeters diameter) or of the solid wood 53 per cent timber, 47 per cent fire-wood, in addition to 10 million c.m. of loppings and roots and 135,000 c.m. (1 million d.z.) of oak bark and 101,000 c.m. of osiers.
- South Germany yields the most solid wood, especially large timber, namely from about 4 million hectares, 14.6 million c.m. or 3.6 c.m. per hectare, thus 39 per cent of the total quantity, from 29 per cent of the total forest area, whilst North Germany produces 42 per cent of the total quantity on 49 per cent of the total area, and Germany 25 per cent of the quantity on 22 per cent of the area, or 2.4 c.m. per hectare. The pine forests in Saxony and Thuringia attain the highest average of timber, about 75 per cent of the content of the solid wood, the beech forests the lowest. The state forests with proportion of 32 per cent of the area yield 43.5 per cent of the whole timber and 40 per cent of the total solid wood products, the independent private forests on the other hand with 36 per cent of the area yield only 25.7 and 26.6 per cent.

5. Administration and Regulation.

By far the greater part of the German forests are regulated and subjected to a systematically ordered administration, the underlying principle of which is to fell only as much

wood annually as is renewed in the growth. This aims at bringing the increase of valuable wood to a maximum. For this purpose different scientific and practically tested methods are employed. Those species of wood are reared which in a given locality produce the greatest economic value. Besides woods of only one species, the planting and rearing of mixed forests is attempted. The principal methods of rearing are thinning in the earlier stages (the age of thickening) and in the older (pole timber) stage, and clearing in the advanced (timber wood) stage; by removal of badly grown, malformed, and valueless trees and of the unwished for species of mixing woods, strong and well--formed timber is continually produced, and the rate of growth of the property is raised. At the same time a first yield preceding the plantation yield is attained to the advantage of the forest-revenue. The instruction in thinning has been especially developed latterly in various directions and brought more in practice, and very successfully.

6. Forest Education,

All these methods and regulations are only practicable when those who are to carry Instruction, Advocacy. them out have been well and scientifically trained in the practice and theory of forestry.

To do this has been one of the first cares of the forest authorities of the Federal States in the interests of their forest-economy. The forest state management in Germany has for centuries past been a model for and characteristic of the science of forestry. Several high schools exist at which

the future state forestry officials are educated in forestry mathematics, law and natural science, but which also stand open to others, and are visited by numerous students from at home and abroad. At the same time they have become nurseries for the advancement and development of forestry and the auxiliary sciences. There are schools of forestry in Prussia at Eberswalde and Münden, the High School at Aschaffenburg and the University of Munich in Bavaria, the school of forestry at Tharandt in Saxony, in Wurtemberg the University of Tübingen, in Baden the Technical High School at Carlsruhe, in Hesse the University at Giessen and for the Thuringian States the College at Eisenach, besides which lectures on forestry are held at the Agricultural High Schools in Berlin, Bonn and Halle. At the nine institutions we have named there are 32 lecturers on forestry, 83 other lecturers for the education of forest-keepers, and numerous assistants. All the institutions are furnished with abundant means of teaching, with libraries, collections, botanical and experimental gardens, and sometimes special teaching districts are assigned to them. The total number of students of forestry amounted within the last few years to between 400 and 450, of whom about 250 were candidates for the State Forest Service. For the Lower Forest Service also, different schools exist in the various states for theoretical instruction, as in Prussia, Bavaria, Wurtemberg, Baden, Hesse, and Meiningen.

The trial of new methods and the improvement of the existing ones is the work of the German Board of Experimental-Forestry, which is controlled by the Union of German Experimental-Forestry Institutions with its seat at Eberswalde. To it belong nine experimental institutions in Prussia, Bavaria, Saxony, Wurtemberg, Baden, Hesse, Brunswick, Thuringia and Alsace-Lorraine. The united interests of German Forestry are represented by the "German Forest-Union," the permanent organ of which is the German Forest Council. At present about 2,000 members belong to the Union. 20 Forest Unions exist besides for separate countries or parts of a country. Finally there is a burial club for foresters, a union of private forest-officials of

Germany, &c.

The national value of the forest, its capa-7. The significance of city to produce necessary goods economically, to provide opportunity for remunerative labour, to favourably influence

the cultivation of land and to employ certain kinds of ground usefully, has made it from ancient times an object of solicitude for the state. The legislation referring thereto, which is very different in the separate states, is specially directed towards the preservation and foundation of enclosed forests and to the recultivation or planting of waste tracts. In the first place the State and other public authorities acquire waste land and plant it. Private efforts are supported actively by means of subsidies and loans from public funds, by information, advice, and by the state authorities which take charge of the management. According to the report of 1900 there are in the

whole of Germany 545,000 hs, of waste land fit for planting and inferior pasture land, i.e. about 4 per cent of the forest area and 1 per cent of the total area.



8. The wood trade and its requirements.

In spite of its noteworthy home production of wood, to the extent of about 38 million c.m. of which 20 millions c.m. is solid timber, Germany is no longer in a position to supply

its own wood. The industrial development of the Empire and the rapid increase of population constantly demand more wood. The additional imports of wood, expressed in cubic-metres of timber, amounted in 1886/90 to about 4.5 millions, in 1891/95 to 5.5 millions, and in 1896/1900 to 8.6 millions. The total consumption thus amounts now to about 29–30 million c.m. or 17–18 million, or 0.54 c.m. per head of the population against 0.38 in 1886/90 and 0.40 in 1891/95. The inference is justified that with a continuance of the present rate of development of the Empire the requirements will still increase, and that the assured growth in the existing home-production of wood will not suffice to meet them. The efforts to change this as much as possible by increasing the timber forests, raising the capacity of production and improving the proportion of timber, are therefore amply justified.

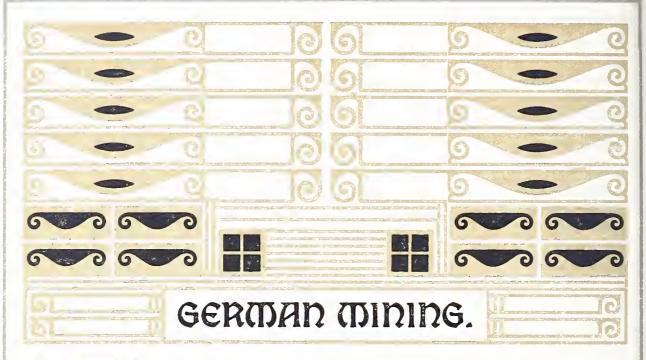
Germany receives most wood from Austria-Hungary, Russia, Finland, and Sweden, and also large quantities from the United States of North America. The chief articles of import, in value about 200 million marks, are shown in the following summary: the export of wood is smaller, and amounted in the last five years to 6–7 million "double centners" at a value of 40–70 million marks.

Imports into Germany.

	1900		190	1
	Tons	Million marks	Tons	Million marks
Timber in the log	1,578,295 989,570 198,322 673,846 230,752 382,702 48,334 8,125 1,642,551 507,473 296,939 477,326	104·3 40·4 131·4	2,451,143 1,377,831 1,019,222 123,428 553,127 166,039 319,054 33,698 7,397 1,336,699 384,189 282,293 380,703 223,936	59·3 23·9 87·0

	190	0	190	1901		
	Tons	Million marks	Tons	Million marks		
Oak staves	52,893 32,317 16,325	6-7	45,094 25,335 15,458	5.4		
Other Timber	33,764	8-1	53,382	10.5		
Wood-bark and Tanners' Bark from Austria-Hungary Polished wood and wood for cellulose	101,100 63,929	8.9	1 02,632 66,073	9·2		
manufacture	148,354	3.0	204,009	5.1		
Fire-wood	193,914	2.9	173,995	2.4		
Charcoal	23,517	1.4	26,305	1.6		
Quebracho	17,374	6.5	118,836	7.9		
	190	2	190	3		
Log timber, rough	1,947,592 1,152,018 739,971 26,552	54·3	2,463,250 1,311,555 1,087,543 20,763	68.8		
Balks, trimmed	448,410 127,065 263,123 46,560 6,159	22.9	524,617 155,818 302,296 53,545 7,314	26.7		
Sawn wood and planks	1,447,648 387,988 293,424 439,678 241,188	92-4	1,729,528 478,796 390,085 452,015 316,583	107-6		
Oak staves	33,771 20,786 7,618	4·1	32,189 19,364 7,076	3.9		
Other Timber	56,288	12.3	48,730	10.8		
Wood-bark and Tanners' Bark from Austria-Hungary Polished wood and wood for cellulose	101,271 66,311	9.0	103,757	9.2		
manufacture	173,149	4.0	220,042	5·1		
Fire-wood	167,085	2.3	140,898	1.9		
Charcoal	23,089	1.2	16,987	0.8		
Quebracho	143,642	8.8	115,916	7-1		

F. Jentsch.





mongst all the various branches of German industry, Mining ranks as one of the first. Its importance is certainly far too little appreciated, because the mines are confined to small districts of Germany, and lie moreover mostly out of the way of the usual routes. The most reliable standard by which to estimate the economical importance of any branch of in-

dustry is unquestionably the value of its productions.

This method is unfortunately not always practicable, because comparative statistics including reliable statements as to value are unobtainable in most branches of industry. Even were it possible to obtain such of a single country, as is being done at present in Germany for commercial and political purposes, detailed comparison with other countries would still be infeasible, as no understanding has been arrived at as yet about the common principles to be respected when making such calculations. It is therefore necessary in the first instance, to fall back on a comparison between the number of workmen employed in the various branches of industry. Such a comparison would be still more valuable if the wages earned by the persons employed were compared and not their number, for this would give an insight into the powers of consumption of an industry. Even then considerable variations would arise, according to whether the branches of industry concerned were occupied in the production of raw or worked up materials. A proportionately larger number of workmen are employed in the raw material industries than in the manufacturing industries where the number is smaller and the other factor of production, the supply of raw materials and partly manufactured products more prominent. If these differences are taken into account, a definite idea can be formed of the importance of the various branches of large

German industries from the figures furnished by insurance statistics. Not only insurance against illness, disablement and the consequences of old age for the entire German working classes, but also insurance against accidents is due to the legacy of the great Emperor and his Chancellor. The latter kind of insurance offers the most reliable basis for comparison, whereby it must naturally be borne in mind that the amounts paid on wages exceeding more than 1,500 marks per year are only calculated at a third. More than half the German miners and smelters receive wages above the amount just mentioned, and always in cash, paid after the subtraction of the amount payable for the assurance against illness and old age; the burden of assurance against accidents is borne by the employers themselves.

Smelting is very closely connected with mining, and more so with the working and making of iron and steel. These industries, which, taken collectively form part of the mining industry, cannot be treated here, although the figures appertaining to the iron industry must not be omitted, because in both of the closely connected industries the most important supports of German industry are embodied.

The figures for 1901 (the last year for which statistics are available) were:

a) Industrial accident insurance: 483,578 establishments 6,884,000 workmen with a wage list of 5,533,392,000 marks;

b) Miners' associations included in the above: 1,929 works (0.4 per cent of the total number) with 607,000 workmen (8.8 per cent of the total number) and wage list of 706,737,000 marks (12.8 per cent of the whole amount);

c) Further, the seven co-operative associations of the iron and steel trade: 26,217 works (5.4 per cent of the total number) with 789,000 workmen (11.5 per cent of the total number) and a wage list of 787,838,000 marks (14.2 per cent of the total amount);

d) Total of b and c together, German mining industry: 28,146 works (5.8 per cent of the total number) with 1,397,000 workmen (20.3 per cent of the total number) and a wage list of 1,494,574,000 marks (27.0 per cent of the total amount).

The small number of works in the mining industry as compared with the total number of the works contributing to the industrial accident assurance, taken together with the percentage of the workmen employed, points to the fact that mining and smelting are the most important of the large industries in Germany; but the figures show still more clearly, that the workmen in mining and smelting have a far greater share in the amount of wages paid than their numbers would lead one to expect. A complete change has taken place in the economical importance of the individual branches of the mining industry. Formerly mining was necessarily limited by the difficulty of traffic to very expensive means of conveyance. The working of rich ores was in earlier times the sole field for mining activity. Owing to the inadequacy of the machinery obtainable, the chief enemy of mining was at that time the inrush of water; people therefore always used to try to work beds

on sloping ground which afforded natural outflow for the water by means of adits.

This work was consequently always limited to hilly ground; hence the German term for mining, which literally translated means "hill-industry." Although we read in very early times of coal being obtained, yet it is hardly a century ago that the coal industry, for instance, in the most important mining district of the whole of Europe, in that of the Ruhr, attained any noteworthy proportions.

The transformation undergone in all means of communication by the introduction of railways opened up undreamed of markets for the coal industry. This development caused German coal mining to flourish and become one of the most important branches of industry. Its prosperity was also considerably enhanced by the passing of judicious mining laws, which most of the Federal States, in imitation of Prussia, introduced in place of a number of narrow minded regulations.

Unfortunately no comparative statistics concerning German mining produce and its value were made before the establishment of the Empire; for this reason it may be interesting to draw up some data respecting the prosperity of coal mining dating from a century ago.

The following figures show the state of the coal mining industry in the district supervised by the Dortmund board of mining:

1	2	3	4	5	
		Amount	Value		
Year	Number of	of pro	oduce	Workmen (including	
	works	in 1,000 tons	in 1,000 marks	officials)	
1792	154	177	684	1,357	
1800	158	231	1,039	1,546	
1830	172	571	3,368	4,457	
1850	198	1,666	10,385	12,741	
1870	220	11,813	67,626	51,391	
1890	175	35,469	282,442	127,794	
1895	157	41,146	273,933	154,702	
1900	164	59,619	508,797	226,902	
1901	162	58,448	512,185	243,926	
1902	164	58,039	486,775	243,963	
1903	166	64,690	535,684	255,992	

These figures speak volumes; although the number of works has not undergone any appreciable change, and has if anything diminished owing partly to amalgamation, the number of workmen employed has increased almost 190 fold, the amount of output about 365 fold and the value 783 fold since the year 1792.

The whole of the productions of the German mining industry together, in the short period of time that has elapsed since the foundation of the Empire, cannot show such an enormous advance as the above; and still coalmines have been continually increasing during the last few decades. The following figures refer to the German Customs' Union, including the Grand-Duchy of Luxemburg:

1	2	3	4	5	6	7
3	Total value	Value of Share		Share of col-		
Year	of mining produce in millions	Bitumin- ous coal	Brown coal	lron ore	Pot- assium salts	umns 3-6 in column 2
	of marks		percentage			
1871	314	69-5	8-3	9.8	1-1	88.7
1880	376	65.4	9.8	9-2	1.8	86-2
1890	726	74.1	6.9	6.6	2.3	89-9
1895	706	76.3	8-2	5.8	2-9	93.2
1900	1,263	76-5	7.8	6·1	3-1	93-5
1901	1,314	77.3	8.4	5.5	3.3	94-5
1902	1,236	76.9	8-3	4-4	3.2	92.8

According to these figures the value of the products of the German mining industry amounted in 1902 to over a milliard marks; this rapid rise in value can only be ascribed to the protection of a powerful and peace-loving government which enabled the mining industry to enjoy uninterrupted prosperity. The above represent the most important progress made in the German mining industry; the other manifold branches of the ore industry also comprise very important undertakings which cannot be dwelt on here.

More than four-fifths of this value is relative to the coal industry, and about three quarters is due to bituminous coal. From the district of the Ruhr alone, which is only a few hundred square kilometers in extent, about one half of the total German bituminous coal products are drawn; next in importance rank the districts of Silesia, along the Saar and near Aix, and

then come the kingdoms of Saxony and Bavaria.

The latter two, in conjunction with the duchy of Saxony-Altenburg, are of considerable importance as regards the most recent branch of coal production, namely of brown coal. In this branch too the kingdom of Prussia leads the way. The industry has developed very much of late years, especially in the provinces of Saxony, Brandenburg and along the Rhine. Originally the first place was held by lignite used for the manufacture of paraffin, but lately this product, which was formerly dependent on the surroundings of the mines for its markets, has been almost exclusively manufactured into coal bricks, so as to render it more easy of transport.

Slack too, which is very poor in gas, has been utilised similarly with very good results; the most important use to which bituminous coal has

been put is that of forming it into coke, which is irreplaceable for many smelting processes in the present state of technics. In 1902 more than 12,000,000 tons of coke were manufactured in the German Empire, nearly three quarters coming from the Ruhr district. Here, especially since the beginning of the last decade, secondary works have been established in connection with the produce of coke, having as their object the production of tar and benzol from the coke furnace gases.

The surplus of these gases was turned to account, up to a short time ago, for producing steam power by heating boilers. For some years past, however, trials have been made to utilise the gas escaping from coke furnaces in a similar manner to the utilisation of the waste gas in blast furnaces, the coal industry, &c., by subjecting it to treatment and then using it for the direct production of power in gas motors. These endeavours are stimulated, without taking the economy of heat into account, by the rapid increase in the use of quick running electrical machines, which are dependent on rapid running motors. This utilisation of power will attain immeasurable importance directly it is possible to make the present day gas motors, which only act in one direction, reversible, similar to the piston steam engine.

The methodical investigations pursued by Germans, which were initiated and are stimulated by the efforts of other great civilised nations, has made amazing progress in this domain during a very brief space of time.

The German coal mining industry can also boast of standing foremost among the combatants against the inimical forces of nature. The gases issuing from the layers of coal, firedamp, &c., are—especially when conjoined with clouds of coal dust—the miners most deadly enemies. Exhaustive researches and continual practical experiments have been successfully made in the kingdoms of Prussia and Saxony for combating these dangers.

Public attention has been especially drawn to such accidents, because they generally entail very great loss of life; yet far less loss of life is thus caused than by the unexpected breaking away of rock. Nearly half the mining casualties in all countries are to be attributed to this latter cause. The Prussian mines administration has of late paid very great attention to this point in the hope of minimizing all accidents as far as possible.

Although these measures are being taken in the province of coal mining, the same precautions will also hold good in other branches of mining industry. This is especially the case with iron ore mining; this latter has developed extensively everywhere, as well as in the older works in Siegerland and Silesia. Thanks to the discoveries of Thomas and Gilchrist it has become possible to utilise the iron ores containing large amounts of phosphorus, which were formerly almost useless. But even the great increase in the production of these ores, especially in Hanover, Lorraine and the grand-duchy of Luxemburg (also belonging to the Customs' Union), does not suffice to completely supply the rising German iron industry with raw material; in order to supplement the supply, constantly increasing quantities of Spanish, Algerian, and lately Swedish ore have had to be obtained. The import of

these ores might be less if the transport of the inexhaustible natural supplies in Lorraine and Luxemburg could be effected at cheaper rates than at present. As regards potassium salts on the other hand Germany is quite independent of other countries, enjoying even a monopoly in them, no other land possessing such abundance of these salts. Mining, which is only a few decades old, and was originally limited to the province of Saxony, has meanwhile extended far into Central Germany. A syndicate has been formed there by the producers, in co-operation with the state mines, some time ago, and showed itself to be profitable, so that the example was followed more or less by the most important of the coal districts. The doubts originally expressed as to the right use of the great power acquired by the syndicate have been gradually silenced in face of the reasonable prices asked by the sellers' unions in the coal mining industry.

During periods of the briskest demand these unions maintained the policy of moderate prices, thereby securing the fullest approbation of their customers; this policy is strikingly shown in a special report made at the instigation of the imperial government, referring to the activity and influence of the Sellers' Union in the mining industry.

The Rhenish-Westphalian Coal Syndicate, which after great trouble was the first to be formed in the year 1893 at Essen-Ruhr, in conjunction with the selling associations for other products of coal mining, has only just recently been reorganised and placed on a broader foundation for the next 12 years by extending its operations to the coal mines belonging to foundries and smelting works. The importance of this move for German economical history cannot be detailed here; suffice it to say that this union, which has been effected after untold trouble by far seeing men under the lead of Mr.

Emil Kirdorff, the General director of the Gelsenkirchen Coal Mining Co. Ltd., will form the backbone of German industrial perseverance. Without this "rocher de bronze" German industries would not have so rapidly overcome the reverses of late years, the usual consequences of a too speedy development, and would now stand in the middle of the crisis, instead of being

ment, and would now stand in the middle of the crisis, instead able to see a fair future before them.

These successes have awakened the desire in the sister industry to coal mining, the iron ore mining industry, to replace its loosely connected associations by a firm alliance and to create a German Steel Works Union, which would comprise the whole German mining industry, from crude iron to the finished product. As soon as the union has been formed it will be seen whether it will be advisable to create a comprehensive system of standardisation according to the American pattern, in which Vanderlip recently perceived one of the most important factors of American progress. In any case, however, the Steel Union will, if it follows the example set it by the Coal Syndicate, be instrumental in disposing of its products at suitable prices, thereby assuring employers the profits due to them, and to workmen living wages and constant work.

- Hereby, the reform of German railway freight conditions is not only of decisive importance to the whole working population of Germany but also to every consumer. Following the example of Prussia, almost all the Federal States have acquired the railways of their territories and made the receipts of the same an integral part of their budgets. The adaptability which ought to be part and parcel of railways as a pre-eminent factor in civilisation is thereby considerably hampered. The freights of German railways possess, in spite of the raw product tariffs introduced during the last few years for wholesale transport, a rigidity which acts seriously on the market, and which is of doubtful policy as far as the budget is concerned.
- In no other industrial country do the freights form such a high percentage of the expenses connected with disposing of products as in Germany. The fact that the Imperial Government has included the extension of the German canals in its programme for a long time past and its intention of speedily effecting the same may therefore be hailed with the greatest satisfaction.
- The mining industry, as the most important freight provider, is most interested in the construction of better and cheaper means of traffic on account of the relatively small value of its products, and in view of the fact that every improvement in this direction means a saving for the benefit of the nation and may promote fresh productive investments.
- The following figures supply information regarding the amount of freight handled by all the German railways:

1	2	3	4	5	6	7		
	Total freight	Of which the	Of which the following amount was classed under					
Year	traffic on German rail- ways	Bituminous coal and coke*)	Brown coal**)	Iron ore (exclusive of pyrites)	Salts	Share of columns 3-6 in column 2		
		in 1,000 t	percentage					
1885	111,200	46,273	7,915	4,461	889	53.5		
1890	151,681	58,510	11,384	6,039	902	50-7		
1895	181,480	67,235	14,604	7,167	1,062	49.6		
1900	264,968	95,370	21,860	11,611	1,290	49.1		
1901	259,380	92,245	22,229	9,857	1,306	48.4		
1902	263,552	91,914	22,175	10,415	1,359	47.8		

- Just as traffic and mining have constantly acted and reacted on each other, so mining and the other branches of German industrial life have affected each other advantageously. For want of the most reliable data—the productive value of the individual groups—a comparison of the relations of the motor forces may not be out of place here.
 - *) From 1900, bituminous coal bricks.
 - **) From 1900, brown coal, bricks and coke.

The enormous strides made by German industrial efforts may be gauged with a certain amount of accuracy from the figures relating to the employment of auxiliary motor power. In 1875 no less than 886,000 h.p. was employed in all branches of German trade, without including that required for agriculture, railways, merchant and imperial navies. This amount however rose to 3,400,000 h.p. in 1895 for the whole of Germany. It may be noted here, that the horse-power of locomotives was estimated at 7 millions, whilst the German mercantile navy had 1,000,000 h.p. in the same year. Unfortunately more recent data as to the motor power in the German Empire are not obtainable. A fair guide regarding the rapid development which has made itself evident during the last few years may be obtained from the statistics for Prussia, which is the largest Federal State in size and industry. According to such statistics the amount of steam engine horse-power made use of in 1896, excluding locomotives, totalled 2,900,000. This amount rose to 4,900,000 in 1903. The horse-power of Prussian locomotives, calculated at a low figure, amounts at the present time to about 7,000,000 h.p., so that added to the above mentioned 4,900,000 a total in round figures of 12,000,000 h.p. for the whole of Prussia is reached. It must also be noted, that these figures only denote the horse-power produced by steam, so that the horse-power produced by water, and especially by explosive motors, is not taken into account.

If these data of the kingdom of Prussia are taken as a gauge for the development of the whole Empire, it may be assumed that the motor power used in the whole of the German Empire amounts at present to about 20,000,000 h.p. The basis of the production of this enormous amount is formed almost exclusive of mineral combustibles, steam acting in a preponderating manner as the agent for such production, as more than 4/5ths of all motors at work are driven by steam. In this domain the latest innovation, the steam turbine, has made rapid progress in its application, as, apart from the comparatively small amount of space it occupies, it is most suitable for working electrical machines. Nevertheless, the time is not far distant, when the advantages described above of the direct utilisation of power by the means of gases will turn the scales in their favour as compared to steam.

The details already quoted regarding the development of motor power call to mind the following words of the well known German statistician Dr. Ernst Engel in his work "The Age of Steam:"

"Despite the enormous advantages of steam as regards its use and cost over all other known motor forces, despite its use in lessening distances and in saving time, it remains an unsolved mystery that solely on that account such boundless capital should have been placed at the disposal of the steam enterprises not only of our own state but also of those of the whole world, thus enabling them to spread with ever increasing speed throughout all cultivated states. This was at the same time materially assisted by the great inventions to which steam also contributed to a certain extent, and by the progress made in physical science, mechanics and technology, since by them nature's treasures

were rendered accessible to all who possessed the knowledge, power, courage, and endurance to make her treasures their own. When nature distributes her gifts, and she does so with no niggard hand, it is incumbent on us not to let them lie fallow; certain tools must be made use of in order, for instance, to utilize steam in boilers, motors, and various other machines, and to turn chemical forces to account. The more means one uses to take advantage of the resources of nature, the greater is the number of people who can participate in the blessings thereof, the more strive to do so, and the more, unconsciously benefit thereby.

Thus only can the enormous amount of capital contributed to steam enterprises be explained, which in their turn exercise a beneficial influence on every side, for the greatest part of the means herein employed are converted into workmens' wages."

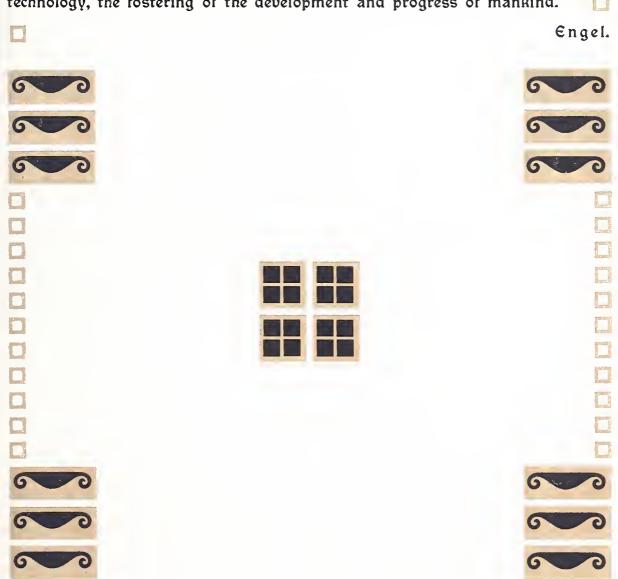
Yet in spite of this great prosperity, the German mining industry ranks only third in comparison with other important mining states. Great Britain, the United States of America and Germany, alone provide 80 per cent, of the total coal in the world, France and Belgium supplying about 9 per cent, so that the following figures represent about nine tenths of the total coal produce, and similarly of the pig-iron.

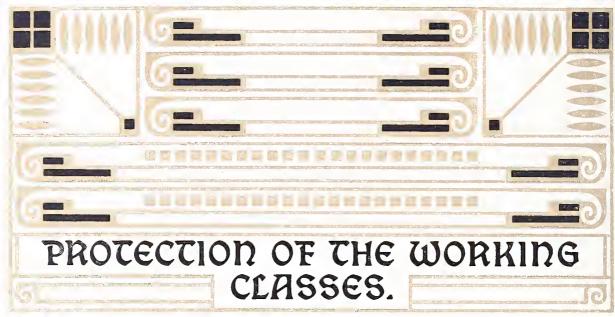
,							
1	2	3	4	5	6	7	8
	1893	1897	1899	1900	1901	1902	1903
			in 1,00	0 tons at	1,000 kg	s	
A. Coal:							
United States of America Great Britain and	165,420	181,630	230,178	244,641	266,064	272,412	323,684*)
lreland	95,426	205,353 120,475 30,798	223,607 135,845 32,863	228,773 149,788 33,404	153,019	150,600	162,620*)
Belgium B. Pig-iron:	19,441	21,492		23,463			(details lacking)
United States of America Great Britain and	7,238	9,807	13,839	14,010	16,133	18,106	18,297*)
Ireland	7,089	8,937	9,572	9,103	8,056	8,818	8,350*)
Luxemburg) France	4,986 2,003	6,881 2,484	8,143 2,578	8,521 2,714		2,405	(det. lack.)
Belgium	745	1,035	1,025	1,019	764	1,069	1,217*)

In 1903 the pig-iron production of Germany (including Luxemburg) rose again to a surprising extent, and it rose for the first time to 10,000,000 tons. Since 1897 Great Britain has had to yield her leading position in pig-iron to the United States, principally owing to the home supply of iron ore

^{*)} Preliminary result.

not sufficing for the demand and its having to be supplemented by foreign ores. The first place in the production of coal, which Great Britain has held uncontested for decades, passed over to the United States in 1899 as a result of the rapid increase in American production. In contrast to Great Britain, whose mining industry has reached a culminating point, that of the United States, although not always free from relapses, has taken a turn of prosperity. This doubtless has been aided not only by natural conditions, but also by the extremely cheap freight rates of the American railways, as well as by the increasing use of machinery in mining, especially the in actual work of extraction. The Exposition at St. Louis will give German visitors a new and welcome opportunity to study the causes of the flourishing condition of American industry, and to interchange ideas and experiences with their American colleagues. This reciprocal action will fulfil one of the most noble aims of technology, the fostering of the development and progress of mankind.







he protection and insurance of labour are two directions in which the German Empire has employed practical measures for improving the condition of the working classes.

Laws for the protection of the working classes relate to those in good health, and aid in forming, carrying out and dissolving contracts, in maintaining life and health, and, by

means of preventive measures, in offering such security as is required to form a foundation for gaining a livelihood. Laws for the insurance of the working classes aim at restoring to their former capable condition those who are injured while performing work, or at least at affording them compensation for loss.

Although the insurance of the working classes was initiated by the message of His Majesty, Emperor William I. on November 17th, 1881, the laws pertaining to the protection of the working classes are due to the decree issued by Emperor William II. on February 4th 1890. This contains the following words: "Although the results of laws and measures for the improvement of the con-"dition of the working classes have been successful and valuable, they do not "suffice for the task which I aspire to perform."

"the working classes, the existing regulations regarding the condition of em"ployees in factories must be investigated in order to remedy complaints
"which have been made in this direction, and to accede to just demands.
"This investigation must be based on the fact that it is one of the tasks of
"the executive power to regulate the period, duration and kind of work per"formed, in order to maintain health and morals, satisfy economical wants
"and claims to equality in law. Propositions as to the form of certain regu"lations for preserving good relations between employers and employees must
"be made, wherein the working classes are enabled, through representatives in
"whom they place confidence, to participate in the regulation of all matters

"of common interest and in the promotion of their interests in all negotia-
"tions with employers and with the organs of our realm. Such regulations
"would give the working classes the privilege of expressing their wishes and
"of entering complaints without let or hindrance; they would also enable
"municipal authorities to be constantly informed concerning the condition of
"the working classes, and to remain in touch with them"
Although several laws relating to the protection of workmen were passed
during the period 1880–1890, before this decree was issued, nevertheless the
law for the protection of workmen, now in force, dates from 1890.
The proposals made in the Emperor's programme were rapidly executed.
Several supplementary laws relating to trade regulations were passed in quick
succession, the most important being that of June 1st 1891, and a law per-
taining to industrial courts (July 29th 1890, and September 29th 1901) and
another for the protection of children (March 30th 1903).
The system of protection of the working classes, now in operation, has
four aspects: 1. Protection in relation to places of occupation, 2. Protection
in relation to occupation itself, 3. Protection in matters relating to contracts
and wages, and 4. Protection in relation to education.
The regulations which come under consideration are principally enforced
by industrial supervisors. The Department in the Imperial Statistical
Bureau for Statistics of the Working Classes, and the Government
Museum for Public Welfare are engaged in extending and improving the laws for the protection of working classes.
The regulations passed are of a legal public nature, similar to those
for the insurance of the working classes, and cannot be changed by any private
agreement between employer and employee; non-compliance is punishable.
The German laws for the protection of the working classes are confined
in their operations principally to the employees in factories, and more recently
to those occupied in shops (public places of sale) as well as to children en-
gaged in domestic industry and other professional work undertaken by the
family. The privilege exists, furthermore, of extending the protection to hand-
work and domestic industries, and this has been taken advantage of by manu-
facturers of clothing and underwear.
The following details concerning the laws for the protection of the work-
ing classes may be given:
[1. Protection in relation to places of occupation. The aim of
this clause is to protect employees from danger to life, health and morals,
while performing their work.
For this purpose employers are obliged to furnish and maintain work-
rooms, mechanical contrivances, machines and instruments in a condition
adapted to protect employees from all possible dangers, and to regulate the
work in a similar manner. Care must be given to provide sufficient light,
space and ventilation, and to remove all dust, odours and gas, caused by the
work, and all refuse. Contrivances must also be provided for the prevention of contact with machines, and precautionary measures taken against other
of contact with machines, and precautionary measures taken against other

dangers associated with such occupations. In addition to suitable mechanical
contrivances, special safety regulations have been issued relating to the per-
formance of work and to the conduct of employees.
Turthermore, employees must fulfil all requirements for the maintenance
of morality and propriety (separation of the sexes during work as far as
possible, separate dressing rooms, wash rooms, and proper closets). For
certain establishments the police authorities are empowered to enforce the
above principles (for instance, properly heated dining rooms during the cold
season, separated from the work-rooms, &c.). The Federal Council has the
right to regulate these measures in a general way for certain kinds of esta-
blishments. It can fix the time of beginning, the duration and the time to
end the work to be done daily, the rests required, and all rules necessary for
practical application in establishments where the health of employees is en-
dangered by excessive hours of work. The council has issued such special
regulations for enforcement in bakeries, coffee-houses, grain mills, hotels and
saloons where waiters and apprentices are occupied, as also in match and
rubber factories, printing establishments, type foundries, stone quarries and
works. At the same time regulations of a special character are made for the
protection of female employees and young persons from the dangers associated
with lead paint, sugar of lead, cigar and alkali-chromatine factories, accumu-
lator establishments, horsehair loom works and brush factories, Thomas slag
mills and store-rooms, zinc and glass works.
Finally, the Federal Council has the right to issue regulations protecting
the interests of employees in open shops. One regulation issued requires
the provision of seats for employees in all places for the public sale of
merchandise.
For subduing phosphoric necrosis the employment of white and yellow
phosphorus in the manufacture of combustible materials has been forbidden
by an imperial law passed on May 10th 1903.
We may also mention here the numerious regulations for the prevention
of accidents which the trade associations have imposed on the establishments
belonging to them, in order to enforce the accident insurance laws; these re-
gulations assist in maintaining safety, health and morality among employees.
For the enforcement of these regulations, special officials have been appointed
by the trade associations.
Il. Protection in relation to occupation. This clause treats of
restrictions in the employment of the working classes on the one hand, and in complete prohibition on the other. The so-called restrictions secure to em-
ployees certain suspension of work, free Sundays, night rest, and breaks during the daily work; they regulate a minimum suspension of work as well as a
maximum duration of daily work.
These regulations for the suspension and duration of work are expressed in a special clause pertaining to Sunday closing. Employers cannot compel
employees to work on Sundays and holidays. Any obligation of this kind in
a contract is illegal.
a contract is inegal.

In addition to the civil illegality of the aforesaid contracts, there is a public law prohibiting the employment of labour on Sundays and holidays under penalty of severe fines. This law applies in a slight degree to mercantile trades. Occupation on Sunday is entirely prohibited in mines, salt works, ore refining works, quarries, foundries, factories, workshops, lumber yards and other building establishments, shipyards, brickyards and on buildings. Hotels, saloons, musical performances, shows, theatrical performances or other amusements and entertainments as well as those occupations relating to traffic are not subject to this law. The Federal Council can, however, extend the prohibition to other trades. The rest to be granted to employees for work done on Sundays and holidays must amount to 24 hours; for two days, a Sunday and holiday following each other consecutively, 36 hours; for Christmas, Easter and Whitsuntide, 48 hours each. In mercantile industries, work on Sundays and holidays, on Christmas, Easter and Whitsuntide Bank holidays is entirely prohibited, whilst 5 hours work at the most is permitted on all remaining holidays, unless the statutes of the community or of municipal unions extend the restrictions, or entirely prohibit work in all or several mercantile trades. During the 4 weeks preceding Christmas and on certain Sundays and holidays when local conditions require an extension of business, the police authorities can make an exception and permit work to be done for a period not exceeding 10 hours. For technical, economical or other reasons se. q. repairs in order to avoid interruption in daily operations, stock taking, public requirements in the provision trade, cases of emergency, &c.) exceptions are made to the Sunday law. In these exceptional cases, however, employees receive a corresponding compensation for their loss of leisure; if the Sunday work lasts longer than three hours, or employees are prevented from attending church, they are entitled to 36 full hours at the end of every third week, or have free time on every second Sunday at least from six o'clock a.m. until six o'clock p.m. Although the aforesaid law prohibiting Sunday work relates to the staff in industries of production and not to the proprietor and his family, the restrictions in mercantile trades must be respected even by the owners Young persons, (under sixteen years of age) with very few exception, are not allowed to work on Sundays and holidays in factories or similar establishments. The German legal administration has hitherto refrained from fixing a standard for the duration of working-days. For male adults a maximum working-day has been established. In trades where immoderately long workingdays endanger the health of the employees, the Federal Council of Trades can pass resolutions fixing the duration, beginning and end of a workingday, and the amount of rest deemed needful; the necessary regulations for carrying these into effect can also be issued. Such regulations have been made relating to bakeries, coffee houses, grain mills, electric accumulators, factories, hotels and saloons. These secure to employees, among other pri-

vileges, an uninterrupted minimum leisure of 8 hours. For employees in shops, or in offices and store-rooms connected therewith, the law provides an uninterrupted minimum suspension of 10 hours. Information concerning other trades, for which the hygienic maximum working-day should be recommended, is obtained from special industrial statistics collected by the Statistical Department of the Working Classes in the Royal Statistical Bureau.

The regulations issued in the interests of adult male employees benefit female and young employees by shortening the working-days still further than the maximum working-day which the present law prescribes for female and young employees.

Adult female employees (adults, i.e., those over sixteen years of age) are not permitted, according to the general legal regulations, to work more than eleven hours daily, and at the most ten hours on the days preceding Sundays and holidays. A break of one hour is granted at noon, or if they have families, they can generally claim for 11/2 hours at noon. On Saturday and the days preceding holidays, work must cease at 5.30 p.m. Occupation during the night (from 8.30 p.m. to 5.30 a.m.) is forbidden. The occupation of women who have given birth to children is prohibited for four weeks after confinement, and for the next two weeks only with the consent of a licensed physician. The same laws are in force in work-shops for clothing and underwear. It is prohibited to employ women in underground establishments, in mines, salt works, ore refining establishments, quarries and pits. The Federal Council can pass laws prohibiting the employment of women and young persons in factories where health and morals are especially endangered, or their employment is only allowed under fixed conditions. The Federal Council has taken advantage of this right in numerous cases, e.g. in relation to the employment in rubber factories, in glass works, wire works driven by water power, factories of chicory, raw sugar, cylinder and hammer works, hatchel rooms, factories of lead paints and cigars, brickyards, horse hair loom works, brush factories, zinc works, &c.

"Youthful employees" are divided into two classes: "children under 14" and "young persons" under 16 years of age.

For the protection of children, the trade regulations (§ 135) and the law dated March 30th 1903 relating to the work of children in industrial establishments are valid.

These laws prohibit the employment of children under 13 years of age in factories, and also of children over 13 years of age unless exempt from attending the elementary schools. The employment of children under 14 years of age moreover must not exceed 6 hours daily. The maximum duration of employment in factories for young persons between 14 and 16 years of age, is 10 hours. The employment of all young persons for night work (from 8.30 p.m. to 5.30 a.m.) is prohibited; and further, a break of an hour at noon, half an hour during the forenoon, and another half hour during the afternoon are required. These laws are also in force in clothing and underwear factories. The employment of young persons in other manufactories where

health and morals are endangered can be prohibited by regulations issued by the Federal Council, as is the case with female employees engaged in rubber factories, glass works, &c.

The employment of children under 14 years of age as pedlars is prohibited with certain exceptions; furthermore, the employment of one's own or other people's children on buildings, in brickyards, quarries worked by day, pits and numerous other establishments, specially enumerated, where children are exposed to dust, as also in stone works, for chimney-sweeping, public driving, mixing and grinding paints, in cellars, in public theatrical performances and other public shows, is not permissible. The employment of children under 12 years in work-shops of all sorts, including living and sleeping rooms and kitchens used for trade purposes, working places in the open air and in all commercial trades, is prohibited. Children over 12 years of age are not permitted to work by night (from 8 p.m. to 8 a.m.), nor during school time in the morning, and altogether only under certain conditions. The employment of children in hotels and saloons, in the delivery of goods or on errands, is subject to similar regulations.

According to the laws in force it is not only difficult to employ children and young persons, but also all minors; in every case the employer must give notice to the local police authorities before employment, and furnish an employment card or book for every person. In factories a list of young and female employees must be furnished, stating the duration and kind of employment, and a copy of the rules and regulations in relation to young and

female employees must be hung up publicly.

III Protection relating to Contracts and Wages. The laws of trade at present in force give young persons a certain guarantee in regard to their employers; for instance all persons who have lost the right of citizenship are prohibited from employing young employees under 18 years of age, or from taking apprentices. In order more clearly to define the terms of employment for certain industries, the Federal Council can prescribe wage and work tickets. —for the clothing industry such have already been issued—stating the kind and amount of work, if job work the number of pieces, the wages, the terms for furnishing tools and materials for the work undertaken, and terms for board and lodging. In factories where 20 or more persons are employed, the proprietor in association with all employees must issue rules and regulations fixing the duration of work, the amounts of wages, terms of notice for quitting, and fines. As security for fulfillment of contract, the employer has the right to retain a fixed amount of wages, or a right of requisition to the amount of wages customary in the locality: the latter can also be claimed by the emplovees. The wages of employees are still further secured by regulations tending to discourage drinking, by the prohibition of paying wages in public houses and saloons, by the enforcement of local statutory regulations fixing times of payment, &c. For minors, books containing entries of wage payments are required. Each payment is entered by the employer and the book given to the minor or his legal proxy to be presented again at the next payment. Local

statutes can also prescribe that the wages of minors be paid to parents or guardians, and only by the consent of the latter to the minors direct. In dissolving contracts both employer and employee have to abide by the mutually agreed term of notice, or in lack of any agreement a 14 days' notice is prescribed by law. On leaving his occupation, the employee can demand a certificate stating the kind and duration of work, his capabilities and conduct, &c.

- IV. Protection in relation to Education. The law prescribes numerous duties on the part of employers and masters of trades towards employees concerning the improvement of their education. Employers are required, for instance, to grant employees under 18 years of age sufficient time to attend a public or industrial school for progressive education (including schools for hand and house work), whether the attendance is voluntary, or in compulsory compliance with local statutes relating to male employees under 18 years of age, to female employees in shops, and apprentices under 18 years of age. A master must not only grant his apprentices time for attending a school for progressive education in a special branch, but must insist on their attendance, watch their movements, and instruct them in all kinds of work executed in his establishment which are necessary for their education. It is also not permitted to occupy young persons during the time fixed by the appointed clergyman for confirmation instruction, sacrament, &c.
- U. In order to obtain a quick and inexpensive settlement by experts of all disputes arising between employers and employees, special Industrial Courts have been established, according to the Imperial Law of July 29th 1890, framed on June 30th 1901, and these are to be found in all cities containing over 20,000 inhabitants. The dispute as a rule is placed in the hands of three members for settlement, an official chairman, a representative for the employer, and one for the employee: all industrial disputes between employer and employee and between employees of the same employer, regarding the performance of work, questions of the engagements, duration of contract and dismissal of employees are points generally under consideration; the return of the employment book, the contents of the same, certificates of conduct, wages books, employment tickets, payment books, capabilities for certain positions, return of certificates of conduct, tools, clothes, &c. furnished for certain work, claims made by one employee against another regarding work undertaken in common from the same employer are also points settled.

In addition to passing judgement, the industrial court is also empowered to arrange disputes. It can interpose in disputes between employers and employees, and aid in settling terms for continuing or renewing work, endeavoring with moral suasion to end the dispute by mutual agreement or by passing judgement.

- The further perogatives of the Industrial Court are to act as an expert in industrial affairs. It must grant information in answer to all inquiries from the government or community, and can also require information to be furnished in special cases by the government and communal authorities.
- Ul. The execution of the regulations for the protection of the workingclasses is in the hands of industrial officials—male and female—appointed

especially for this purpose. Inspection is aided by the police authorities and [particularly in the protection of employees on buildings] by all organs of the working classes, and the officials have the same rights as the local police, particularly in the inspection of all factories and works. They generally possess a technical education, and in addition to university study they have obtained expert knowledge in industrial inspection. Their duties are determined by the governments of the Federal States. They are required to produce annual reports of their official operations and these are either partially or entirely published. The industrial inspectors are not only engaged in supervising the execution of the laws for the protection of the working-classes, but in account of their thorough knowledge of the conditions existing among those classes they are expected to make suitable proposals for the improvement of the laws for the protection of labour.

VII. In order to investigate the circumstances of the working-classes, especially for collecting and periodically publishing material for statistics in relation to these classes, a special department for statistics of the working-classes has been established since April 1st 1902 at the Imperial Statistical Bureau, and this has been assisted by an auxiliary council for labour statistics composed of members of the Federal Council and the Imperial Parliament. These works, prompted by the aforesaid department, are partly published in the "Imperial Employment Journal" issued monthly since April 21st 1903 (Price 10 Pfgs. per number or 1 (1)). annually) and partly as special printed matter. The information concerning the general condition of the working-classes and the existing state of certain branches of industry published in this manner, and especially the aid which the auxiliary council gives in presenting the results to the Imperial Chancellor, furnish further evidence of the progress made in the protection of the working-classes.

Ulll. The interests of the working-classes are further promoted by the Imperial Duseum for the welfare of the working-classes, established at Berlin-Charlottenburg since the spring of 1903. Its aim is to exhibit models, safety appliances directly attached to machines, plans, &c., in order to give those interested, (employees, employers, trade associations, manufacturers, engineers and government authorities) an opportunity of obtaining information about the most important inventions the progress made in protection against accidents and in industrial and social hygiene. These exhibitions are permanent, and consist of all the new appliances which are worthy of imitation, and prove thus an effective incitement to progress and a valuable factor in all social undertakings. A similar museum of appliances for the welfare of the working-classes, but less extensive, is situated at Dunich.

IX. The results of the regulations for the protection of the working-classes are in general very satisfactory. Owing to the laws for protection in relation to places of occupation, enough has been done to insure health, safety and morality in numerous branches of industry to all employed. Rapid progress has been chiefly made where special regulations have been issued. Improvement of conditions is more easily effected in newly built esta-

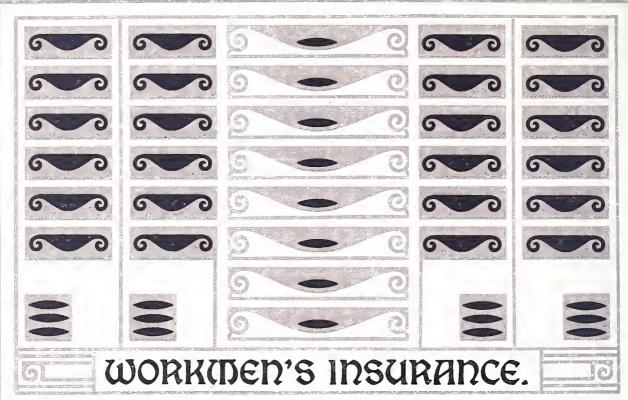
blishments, and this is due to the fact that the proprietors themselves are interested in the welfare of their employers. Working materials, tools, work-rooms and methods of work are being chosen and arranged more and more in such a manner that all injury and danger to the workmen is avoided as far as possible.

The protection in relation to occupation has resulted in rendering Sunday and night work only necessary when technical and economical reasons urgently demand it, at which times wages are increased. The regulations concerning a maximum hygienic working-day for males, and a general maximum working-day for young persons and females, have also caused an increase in the inclination to shorten the duration of work, especially in large cities. In spite of the restrictions put upon the employment of young persons and females, there is no apparent decrease in it, which is a proof that industrial branches are able to continue work according to the regulations in force. The employment of children in factories has almost entirely ceased. Experience has proved that the regulations adopted in large establishments for protection in relation to contracts have had excellent results, and have aided in settling terms and improving the conditions of work. The employment tickets placed free of charge at the disposition of employers in certain cities, have proved very useful in this respect. On the other hand, committees of employees have not been made extensive use of, only a number of establishments engaged in extensive operations and certain government works possessing such institutions. Many employers entirely omit any notice to quit, in order to be able to dissolve contracts immediately, if desired. Only isolated cases have occured where the regulations against drinking and against payment of wages in saloons have been violated. Another day in the week is frequently chosen as pay day instead of Saturday. Several communities have already adopted statutes regulating the time of payment of wages. Payment books for minors have not proved to be advantageous. The payment of the wages of minors to their parents has only occured in a few cases.

There are 354 Industrial Courts in Germany; in 1900 there were 316. Their powers are taxed to the utmost, which shows how serviceable this institution has been. They were occupied with 85,915 industrial disputes in 1902, of which 80,454 were caused by employees, and 5,461 by employers. 57 per cent of these were settled by mutual agreement. In 4,728 cases the proceedings lasted 1 week, in 5,033 cases less than 2 weeks before the announcement of the verdict. In addition to a quick and inexpensive arrangement of disputes at the hands of experts, the Industrial Courts have assisted in increasing the knowledge of the law, especially of that relating to industrial contracts among the industrial classes; this occurs, on the one hand through the instruction given to the disputants by the presiding judge, and on the other hand through the instruction given by the assistants to their electors by reproducing in the form of lectures their experiences gained in the Industrial Court. Increase in legal knowledge will cause a decrease in the number of cases. The Industrial Courts have not as yet been active in settling strikes

successful in bring tions. Their impoundisturbed pursus mical relations, is The introductageous; there are and 19 female assist that the regulation dead letter, but are judiced, propitiating has won for their able to dispel the They are thus abworking classes, a laws for their prospectation of Social peace Boards of Employed Secretary for the inse of collective eletween organisation terms of employment in a large number periences in this content of the wood	arging employees, buging about a peacefurtance as agents in it of trade, as well continually increasing the present 213 in Gerstants, as well as 6 cms for the protection executed in a conscient and yet judicious and the confidence of a first shadows of le to obtain an insignant to make useful prection. In industrial circles yment already ment not yet put into force interior, expected to comployment contracts ions of employers and ent (wages, duration of branches for a latection incite continuity of mention in assisting the Deport of their duties. The porking classes, in report of the circumstances of the circu	I result in strikes industrial activity as a steady develoring. Ispectors has proven many, to which much emical experts. It of the working class entious and proper rattitude towards emboth parties, so a quarrel between the into the circum propositions for the will be still furtioned in the Emple (according to the come into force Jan will be renewed so dorganisations of each of work and the keep of work a	of extensive proporand in promoting an pment of our economed extremely advants be added 141 male is due to them alone that they are often in master and man. It is a stances affecting the improvement of the improvement of the improvement of the State wary 30th 1904); the imilar to those used imployees, regulating eping of apprentices in the favorable expers, employees and it is of the Working it is central office for in giving information ons, &c., and thereby

WORKMEN'S INSURANCE





he purpose of the exhibition representing the German Workmen's Insurance system, is to give a complete picture of the methods and activity of social insurance.

The workman's insurance stands in correlation to legislation concerning his protection, both supplementing each other in the social political provisions for workmen which are in-

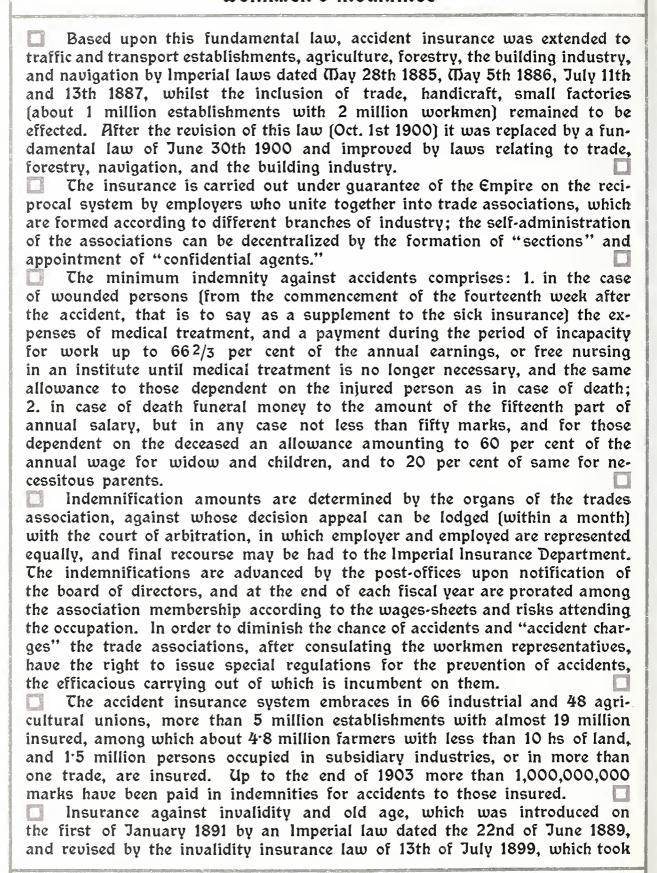
tended to assure the masses of wage-workers of modern civilised industrial states against the dangers of their calling. On the one hand, protective legislation aims at preserving working ability through protection of life and health; on the other, in those cases where either through sickness, accident, or other invalidity working ability is temporarily or permanently lost, workmen's insurance seeks, by means of corresponding indemnity—unlike mere almsgiving—to afford assistance to the workman and those dependent on him. Provisions for workmen effecting these aims have been provided by imperial legislation, stimulated by the imperial messages of November 17th 1881, and February 4th 1890—Germany acting as a pioneer in this domain.

The peaceful work of conciliation and social reform began with the memorable message of His Majesty Emperor William I., dated November 17th, 1881. This message expressed the conviction that in the inevitable exigencies of modern life the needy circles of the population had a claim to a high measure of protection, and that it should be the object of an administration based on true Christian principles to meet such claims by combining the actual capabilities of the people into associations. A thorough adjustment of the insurance systems relating to sickness, accidents, invalidity and old

WORKMEN'S INSURANCE

age was accordingly considered to be a most pressing need. Experience having proved that neither the workman nor the aid granted by the state sufficed to solve this problem, new methods were adopted, and by means of compulsory insurance laws the classes of the population concerned united together into corporate bodies possessing self-administration. The trade or district (township) associations consequently became the natural bearers of the insurance risk. The foundation-stone of the whole system is mutuality and self-administration. Compulsory insurance is limited in general to those who are dependent from an economical point of view, that is to say wage-workers and subordinate officials with a salary not exceeding 2,000 marks. However, higher officials and persons carrying on small businesses are allowed to participate in this compulsory insurance, or to insure voluntarily according to need. Every insured person has a lawful claim, with the right to legally defined assistance, free of cost. Insurance against sickness is regulated in the case of commerce and trade by a law dated June 15th 1883 and a supplementary law and amendment in same dated April 10th 1892, and May 25th 1903 respectively, whereas the regulation of insurance relating to agriculture and forestry was left to the statutes of the various districts or states concerned. The minimum of relief in case of sickness entitles the beneficiary to free medical treatment and medicine for 26 weeks, and in case of incapacity for work, financial assistance to the extent of one-half of the average daily wage, or to free hospital-nursing, besides one half of the allowance for these dependent on the sick person. Further it entitles sick women to relief for six weeks after their confinement, and in case of death burial money amounting to twenty times their average daily wage. The necessary means are raised by weekly contributions (not higher than 4 per cent of the average wage) two-thirds of which is borne by the insured, and one-third by the employer. The adm
trades or localities, whose presiding officers are chosen from the insured and
penditure of about 200 million marks.
(its many deficiencies being equally harmful to employer and employed) by a legal (social) provision, which also insures the person injured, or his sur-
vivors in cases of casual accidents, or such as have occurred through the
fault of his co-workers, or through his own carelessness. The personal liability of the employer is changed into an economical charge
upon the entire trade concerned, which is apportioned to single establishments
according to the measure of their risk (workmen employed, and danger).
Tor lack of precedent, the regulation of accident insurance could proceed
but slowly, the original law of July 6th 1884, which was limited chiefly to
industrial (manufacturing) establishments, being the first issued.

WORKMEN'S INSURANCE



workmen's insurance

effect on the 1st of January 1900, completes the system of workmen's
insurance. The bearers of the insurance, which includes all branches of
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trade, are territorial insurance institutions, guaranteed by the state, whose
self-administration is shared equally by the employer and employees. The
insurance entitles those incapable of work to pensions without regard to
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age, and gives old age pensions to septuagenarians regardless of working
ability. Further it assures return of subscriptions paid by insured women
who marry before receiving a pension, to widows or orphans of those in-
sured persons who die before receiving an allowance, and to those insured
who become invalid through accidents, but who do not receive an invalid
allowance because of their higher accident insurance allowance.
The means necessary for this insurance are raised through a yearly
contribution from the government of 50 marks for each pension, together
with weekly contributions to an equal amount from employer and employed.
The amount of the same for a definite period is so estimated in advance,
that the capital value of the pension amount which the insurance institution
·
must bear is covered, as well as the reimbursements of contributions, and
the other expenses of insurance.
For the purpose of estimating the contributions and pensions, five wage-
-classes are formed, with yearly incomes of not more than 350, 550, 850,
1,150 and exceeding 1,150 marks, and the contributions are fixed at 14, 20,
24, 30 and 36 pfennig respectively.
Certain transitional regulations in favor of those insured who have
already become incapacitated for work before they are entitled to compensation
(a period of 200 or 1,200 weeks, during which they contribute to the accident
or old age insurance fund), or to those who reach their seventieth year of
age, guarantee the immediate payment of the invalidity or old age pension
by shortening the time of waiting concerned.
The invalidity insurance scheme comprises about 13.5 million persons in-
sured, or almost the whole of the hired working classes, and during the first
twelve years of its existence (1891–1902) in addition to 1,093,681 subscriptions
returned, and 156,000 cases of maintenance, has paid 720,000,000 marks
(including state assistance to the amount of 252,000,000) for 1,302,900
allowances (402,856 old age and 900,044 invalidity cases) and has received
1,359,000,000 in contributions.
According to this, it is principally due to the Imperial social policy,
that almost the whole body of working men in Germany is insured against
sickness, accident, and invalidity, and that a million marks is devoted daily
to the welfare of labour, whereas in other countries without compulsory in-
surance only a fraction of the workmen enjoy similar privileges; consequently
such countries are considerably behind Germany in the reliability and scope
of the efforts made for the insurance of workmen.
Certain transitional regulations in favor of such insured persons who
during the first five years after the enactment of the law became incapable
of work, or at the time of its enactment had passed the age of forty,
• 5

workmen's insurance

guarantee the immediate payment of the invalidity or old age pension by
shortening the waiting time concerned.
To the initiative of Imperial social policy the blessing is therefore due
that in Germany nearly all workmen are insured in case of sickness, accident
and invalidity. Every day 1,250,000 marks are spent for this branch of work-
man's protection alone. In countries without compulsory insurance, scarcely
one tenth of the workmen enjoy a similar protection, which moreover falls
considerably short of the German workmen's insurance in certainty and scope.
According to the latest statistics (for 1901), the following number of
working persons have enjoyed the benefits of:
1. Sick Insurance: 3,617,022 sick persons (with 66,652,488 sick days),
with 163,400,000 marks indemnities (sickness, death money, as well as cost
of medical attendance);
2. Accident Insurance: 585,596 wounded, 12,128 married women,
26,612 children, 256 parents (as dependent upon the wounded being cared
for in hospitals); 53,481 widows, 87,035 children, 3,147 parents (of deceased);
total 768,255 persons, with 100,000,000 marks indemnity;
3. Invalid Insurance: 549,000 invalid pensions amounting to
66,300,000 marks, 203,000 old age pensions amounting to 24,700,000
marks, total number of pensions 752,000 amounting to 91,000,000 marks,
191,000 persons with 6,900,000 marks refunded, 33,000 persons in medical
treatment with 7,100,000 marks, total 976,000 persons with 105,000,000
marks indemnity.
From the above table it will be seen that in one year over five million
persons in need of help received about 370,000,000 marks; during the
whole period of 17 years (1885–1901) 50,000,000 persons in round
numbers (sick, persons injured, incapacitated and their families) received
indemnities amounting to 3,000,000,000 marks as a result of the le-
gislation for the insurance of workmen, although the most far-reaching
clauses of the law (insurance against invalidity) only came into force on
Jan. 1st 1891. The workmen have only paid the smaller part of the con-
tribution, and have already received about 1,000,000,000 marks more in
compensation than their contributions amount to. If the amount of the
two last years (1902 and 1903) be added to that of the miners' sick-clubs
(whose total share represents about one-tenth of the other sick-clubs) the
total sum of money paid to workmen for compensation is 4,000,000,000
marks.
The significance of this insurance for German workmen extends far
beyond a simple financial one, for it has become a social-political school for
the whole nation.
The importance of German workmen's insurance towers far above its
financial aspect. Through the mutual participation of the employer and employee
in the administration and payment of contributions, the workman is himself
daily reminded of the moral duty of making provision for the future from
his own resources, the employers of their social duties to their employees, and

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both parties of their common interest in their calling. Thereby social reconciliation is effected where otherwise special organisations array themselves against each other as antagonists. The workmen's insurance with its self-administrative bodies, its concentrated means and powers, has brought goals hitherto considered unattainable within easy reach. Thus the free initiative of accident co-operative associations, invalidity institutions and sick clubs has been directed towards restoring lost or menaced working ability, and it has also rendered the cure of invalid and disabled workmen much more rapid through the erection of special institutions. (See exhibits in German workmen's insurance section.) The successes attained in this domain have been instrumental in directing the entire efforts made for the welfare of public regimen into new channels. Of greater importance, however, is that the cure of invalid and disabled workmen is more rapidly effected through the erection of special institutions. (See exhibits of the Imperial Insurance Department.) Because of the success reached through these measures, public sanitation has been directed into entirely new channels. Above everything else, the co-operation of these organisations with those of free charity, especially with the "Red Cross Society" and the "National Women's Club," has made it possible for even the smallest and poorest country parish to systematically cure the sick, and to undertake an organised campaign against that frightful national pestilence, tuberculosis of the lungs. (See statistical and graphic exhibits in the Exposition.) Instead of smothering the free initiative of self-helping bodies, as many had feared workmen's insurance would do, it has on the contrary enabled them to develop to their highest powers.

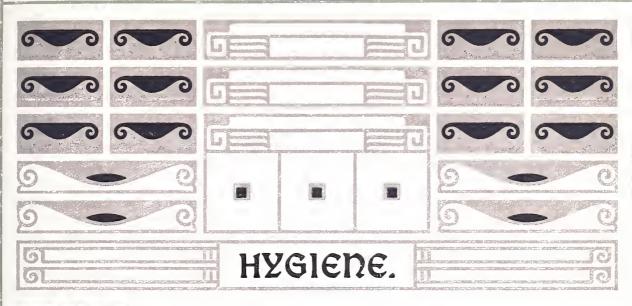
The reserve capital of 1,500,000,000 marks, about which such different opinions exist, has furnished the means for solving the most important social economical questions. Up to the end of 1902 over 400,000,000 marks had been expended from the funds of invalidity insurance institutions for the construction of workmen's dwellings, sick and convalescent houses, sanatoriums, public hospitals, homes for travelling workmen, public baths, blind asylums, kindergartens, slaughter houses, systems of water works, sewerage and draining plants, street paving, savings banks, co-operative stores, and similar institutions for public welfare, as well as for the payment of agricultural loans (mortgages, light railroads, land and road improvement, development of cattle breeding, &c.) all measures the final aim of which is to cause the masses of the people to participate to an ever increasing degree in the advance of civilisation.

The advantages of German workmen's insurance, in distinction to other systems, is, that:

- 1. It guarantees the support required by necessitous persons immediately, and as a well earned right;
- 2. it gives both employer and employee common interests in their duties, and thereby acts in a way as an instrument of social reconciliation;
- 3. it awakens a feeling of social duty throughout the nation; and
- 4. it strengthens the working and defensive power of the nation.

workmen's insurance

Arbeiterversicherun "Entstehung und s sicherung," "Unfall Volksgesundheit,"	details please refer to the pamg des Deutschen Reichs," "Einric soziale Bedeutung," "Statistik der lerhütung und Arbeitshygiene," "Arand "Arbeiterversicherung und Veutsche Arbeiterversicherung	htung und Wirkung," Deutschen Arbeiterver- rbeiterversicherung und olkswirtschaft," to be
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he increasing success with which the principles of modern hygiene have been applied to practical life have led to its development from the region of pure theory into a powerful factor influencing state administration in all its branches. Obedience to its laws has caused the recognition of the fact that the maintenance of the health of the individual is the

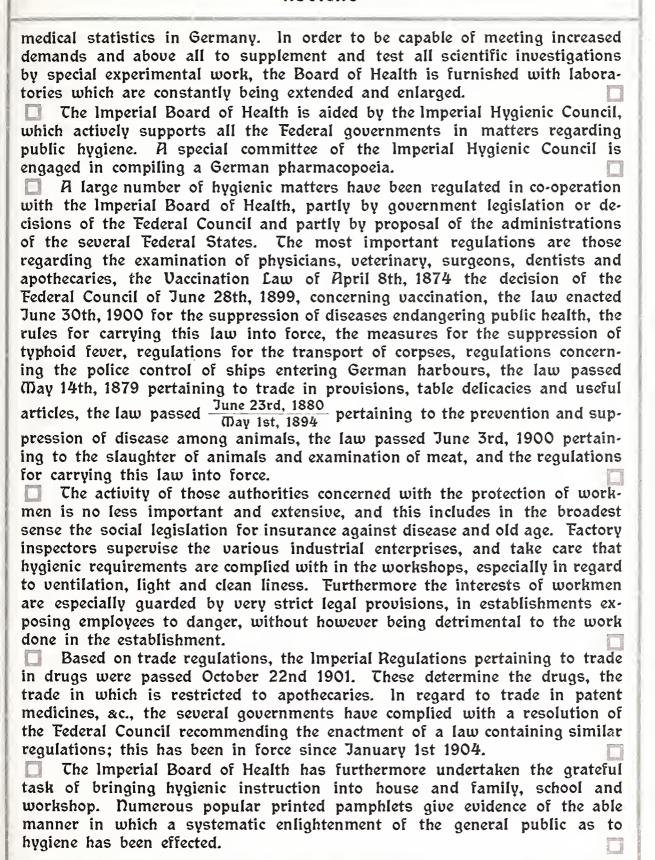
chief requirement for the healthy growth of the state. In such places therefore where the nations of the earth meet in friendly competition to exhibit the results attained in manufacture, science and art, hygiene is beginning to occupy a prominent position. It was therefore the duty of Germany to show the educated public as well as the scientist at St. Louis, what has been accomplished by hygiene and to present in a special German hygienic exhibition, descriptions, illustrations and models of all discoveries which her scientific investigators have made as well as all practical achievements of her specialists in technical hygiene.

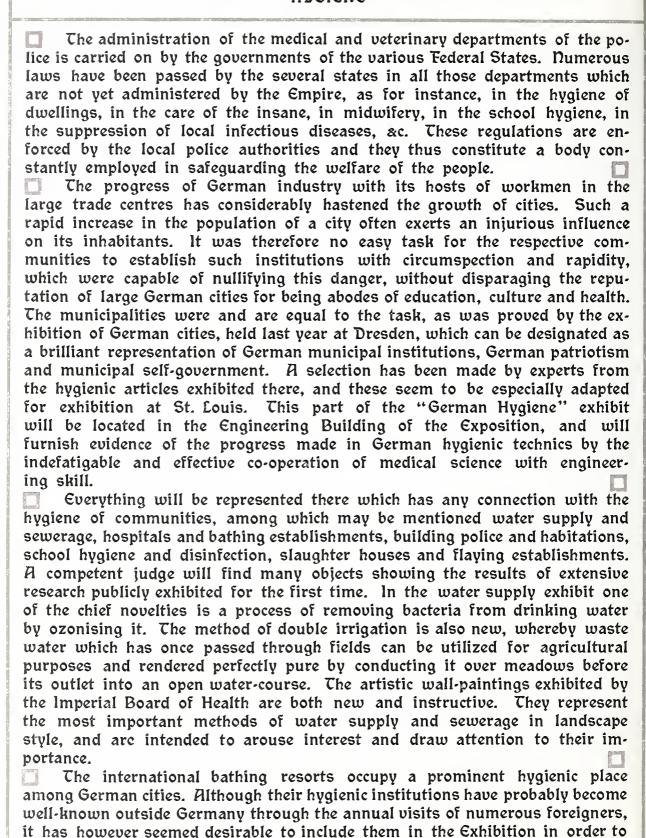
A recognition of the social-political principle that the working capacity of the human body is state capital which bears the highest interest, has been reserved for the present generation. This principle necessitates, the maintenance of a high degree of health in individuals and consequently imposes upon physicians not only the task of curing disease but that of preventing it. All progress in this direction is synonymous with economic gain. On the other hand health is the source of a nation's ability to defend itself, and the first condition for the recognition of a nation's power by other countries. The acknowledgement of this fact has induced Germany, in the last few years, to extend hygienic activity, hitherto applied solely in public affairs, to the preservation of the health of the individual. Influence is thus not only brought to bear on state and communal hygienic institutions but on the life of each individual, thus nurturing a race, powerful and robust enough to fulfill the tasks imposed on it by cultural progress.

All hygienic improvements in Germany, however, have not originated solely in utilitarianism, but have their source in spirit of brotherliness frequently found in circles having ideal views of life. The aim in view is to help the poor, the weak and the diseased, and thus, institutions are called into existence which simultaneously fulfill social-political demands. The wealthy classes do not hesitate to unite with the state and community in promoting hygienic interests, and this aid has found systematic and active expression, as will be shown later on. These private undertakings also include organisations devoted to special purposes, whether relating to the health of the individual or of the general public. The German Society for Public Hygiene stands at the head of these movements and for 28 years has endeavoured in itinerary meetings, to call the attention of authorities and private individuals to important hygienic problems, to aid in furnishing scientific and technical solutions and above all to educate the general public. The timehonoured meetings of German naturalists and physicians form a special group, and have propagated hygienic questions far and wide. The German Society for Popular Hygiene endeavours to improve the health of the individual in all directions, supplementing the work of the German Society for Public Hugiene. The German Red Cross Society has also included hygienic propaganda in its programme, and among other societies with similar aims may be mentioned The German Society for School Hygiene, the German Society for the Suppression of Quackery, the German Society for Public Baths, the German Committee for the Investigation of Cancer and the German Society for the Suppression of Sexual Diseases. The periodicals published by the various societies afford the general public a mass of instruction and at the same time offer ample material for treating the questions at issue.

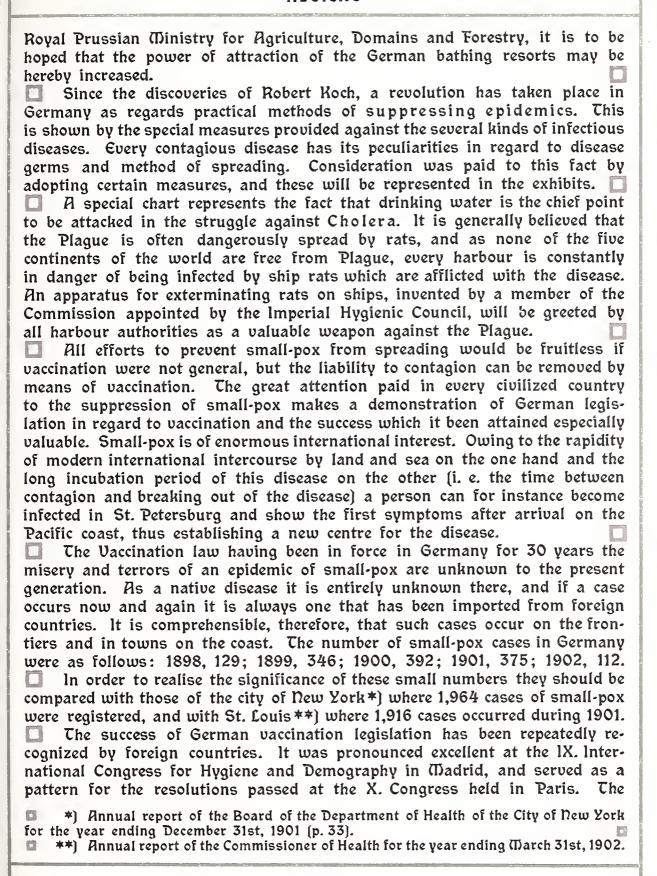
The development of hygienic institutions in Germany is chiefly due to German science which has so ably adapted itself to the needs of life and has opened the way for practical work by careful and successful investigations. The Munich school, distinguished by the name of Max von Pettenkofer, introduced hygiene into public life. It is furthermore universally recognised that the great discoveries of Robert Koch are not only of vast scientific importance, but have proved of great value to public and private hygiene and practical veterinary science. The busts of these celebrated German men form the best artistic ornamentation of the German Hygienic Exhibition.

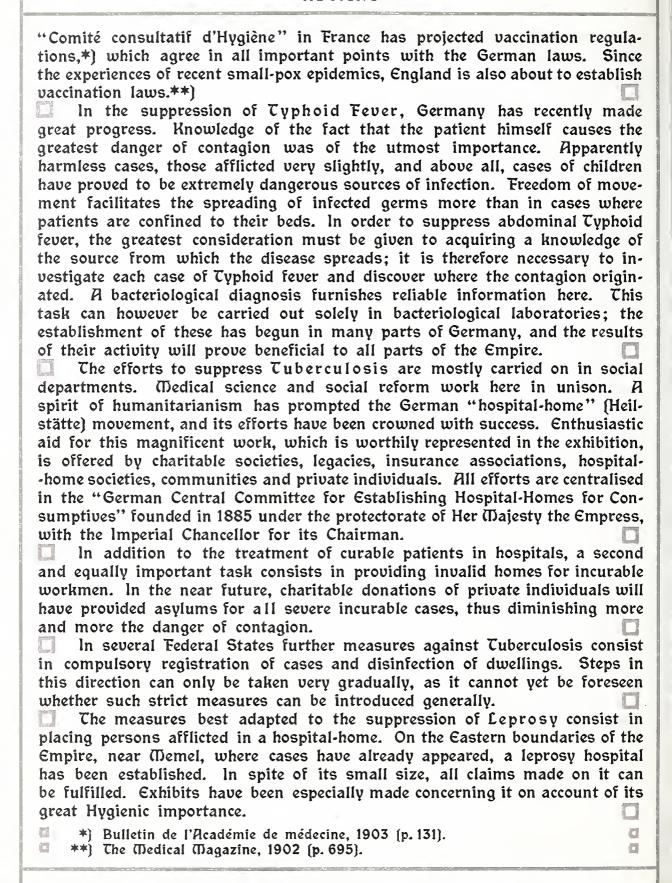
The participation of the government in public hygiene led to the formation of a central technical administrative institution, the Imperial Board of Health, directly subordinate to the Imperial Department of the Interior, and bearing the character of a council. This institution was called into existence towards the end of April 1876. Its duties consist in supporting the government in preparing and putting hygienic-police measures into practice and in observing their effects as well as in furnishing official information to the authorities in all cases, when required in observing the development of hygienic-police and medical legislation in foreign countries, and in compiling

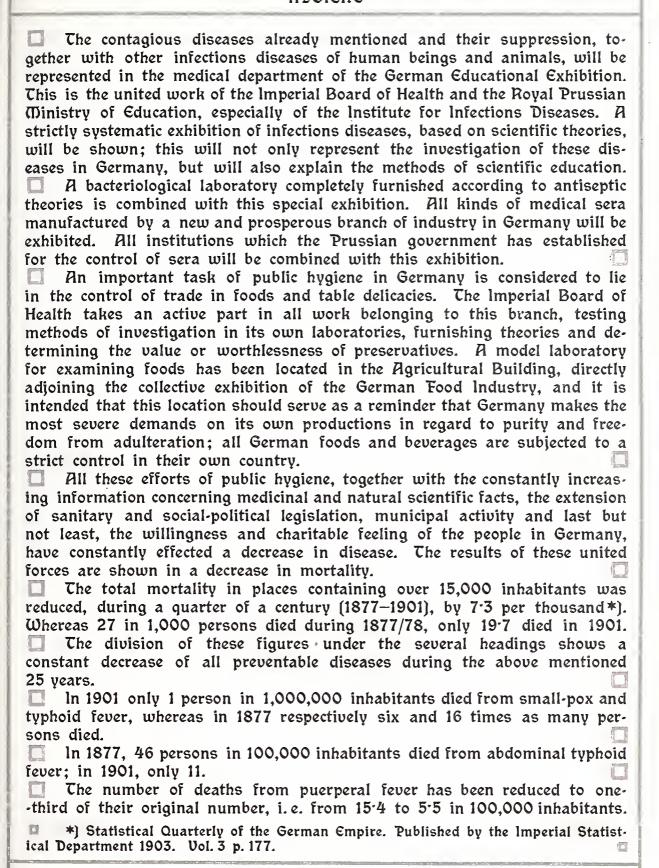


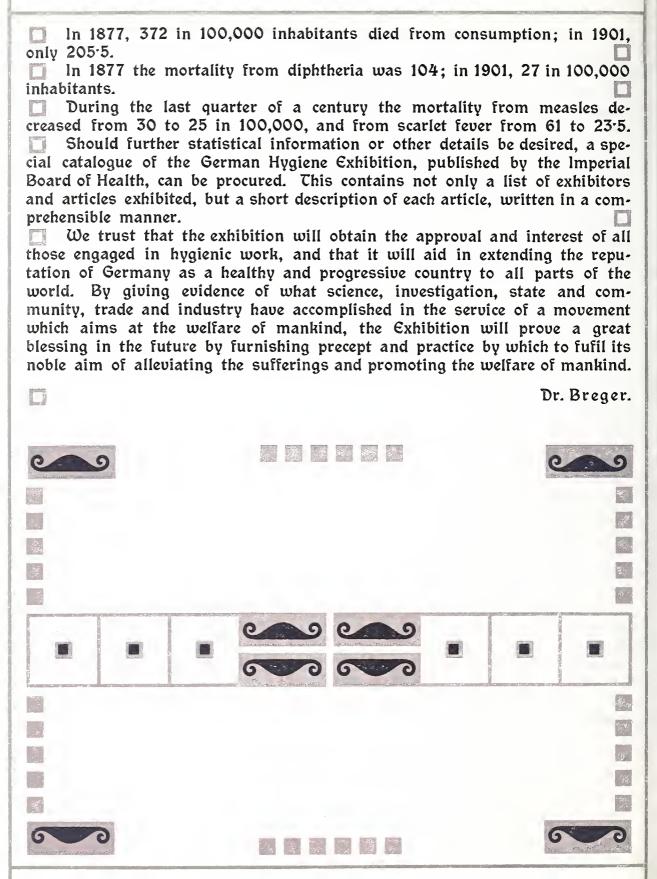


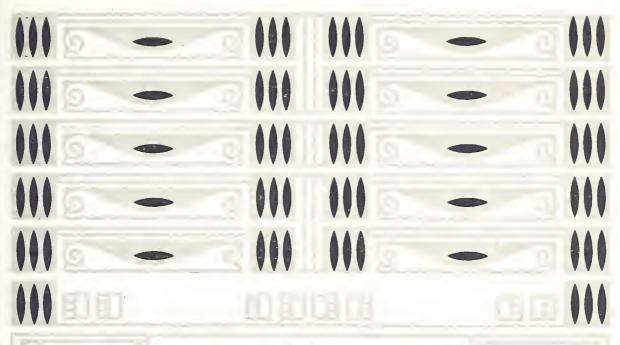
extend their reputation to wider circles. Exhibited under the direction of the











GERMAN CITIES.



rom time immemorial the cities of Germany have been of importance, and within Germany itself they have always been the most powerful and influential factor in the commonwealth. The decline of German power which began during the disorders of the Thirty years War in the seventeenth century and continued through the eighteenth, checked them, however, in

their development, and brought their growth to an early standstill.

Since the foundation of the German Empire, which was prepared by the economical union of the Federal States within the German Zollverein, the national strength of Germany has greatly increased, and the latent forces inherent in the Empire have been developed. Industry and trade grew from year to year in an unpredented manner, and under the German Eagle the export trade of the country has increased to such an extent that Germany is now second among the commercial nations of the world. Prosperity has increased throughout Germany; above all the population has grown with a rapidity unprecedented among European nations.

This great progress of Germany has been of the utmost possible benefit to its cities. People rushed to them in great numbers, and they grew with surprising rapidity. The population of Berlin soon rose to over a million (1,888,848 inhabitants in 1900) and Hamburg, Munich, Leipsic, Breslau and Dresden have either increased, or will increase to over half a million inhabitants within the next few years. This growth, however, has not been limited only to a few of the important business centers; it shows itself alike in the north,

south, east and west. Some of the cities, more especially industrial centers, show a sudden increase of population that is without precedent. For instance, Chemnitz had a population of 68,000 in 1871, and the census taken in 1900 totalled 182,000. This presented a new problem to municipalities. It was not possible to accomodate the sudden increase of population within the old city limits. New buildings had to be added. Endeavours were made to guide the growing activity in building into new paths, and to add and include new territory whilst strictly maintaining the old appearance and characteristics of the different towns. This new movement found its expression in city building. In the first German City-Exposition, held at Dresden in 1903, a great many city and building plans were exhibited, demonstrating how the cities strove to combine old systems with new and to accomplish the tasks before them. The result of this practical movement has been the development of a particular science during the last ten years, i. e., the art of municipal architecture, which is now taught in all German technical high schools. The question at stake is, how can new land be utilised in a systematic and practical manner by means of building laws and boundary regulations. Building plans, however, ought not to be designed according to geometrical rules, but ought to be governed by the exigencies of traffic and by artistic considerations, whereby as much care as possible should be taken to preserve the old appearance and historical character of the city. All the building plans in Germany show how carefully these rules are adhered to.

From time immemorial the condition and development of schools have been closely connected with the growth of cities. The state participates in this, as there are state as well as municipal schools with the same curriculum. The state establishes a minimum standard; the cities, however, go far beyond this moderate demand in satisfying educational requirements. Not only do they erect their school buildings, but they also furnish them with all means for instruction. They employ capable teachers and exert a comprehensive and beneficent quardianship over their scholars outside the school. No sooner is a young citizen of the German Empire born into the world than he is taken and cared for, if need be, at some public crêche; then, as soon as he can make free use of his limbs he enters the nursery-house, and from there he goes to the school where he has play-grounds and skating-rinks in winter and is taken on excursions into the country in the summer. In short, municipalities make every effort to supply their coming citizens with bodily strength as well as mental cultivation. In many cities more than half the annual expenditure is devoted to the maintenance of schools for the different stages of education "gymnasiums," "realschulen," higher elementary and peoples schools.

Two movements have come particularly to the fore during recent times, one of which is for encouraging the teaching of trades. As far back as the middle ages municipal commoners already did much in this direction. Then, simultaneously with a falling off in the work of artisans and guilds, a neglect in industrial education made itself apparent. Now, however, the cities are

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taking the matter up again earnestly, not only to make up for lost time, to attain the higher standards required nowadays. Germany must open new fields, and this more thorough industrial education is intended to be a means to this end. State and municipality alike are untiring in their zeal in encouraging and assisting in this branch of education.

In another direction, but closely allied with this idea of industrial education, the cities are making progress, supported by the public spirit of their citizens, in the erection of high schools, commercial high schools, academies, &c., or where this is not expedient by establishing high school courses, so that their citizens may be in the closest connection with the progress of science.

In the care of the poor and sick as well as for purposes of public welfare, cities have to face new problems and difficulties every day. Here public and private beneficence go hand in hand, as their field of activity is the same. Benevolent citizens and societies for the promotion of public welfare unite in meeting to resist the evils which are closely connected with the advance of culture and prosperity. This work is ever increasing, and municipalities are constantly being called on to lend greater support to old institutions or to accept the responsibilities of new ones. The work includes the quardianship of foundlings and foster-children, providing warm rooms for the poor in winter, refuges for the homeless, offices where the unemployed may obtain work and employment bureaus. The hospitals, above all, constantly increase in their demands on the municipal exchequer. The requirements of physicians and patients grow from year to year, not only for hygiene but also for the erection of hospital buildings, so that the average expense for each single patient has risen considerably during the last ten years. The new hospitals in Germany have been erected in accordance with every demand of modern hygiene.

The gas, water and electric works are also in the hands of the municipal administration, and occupy a special position. The first municipal gas-works were erected at the beginning of the nineteenth century; they were private concerns, and a long time elapsed before cities erected their own gas-works, some remaining even now the property of private companies. The first central water-works were opened at Hamburg in 1849. Other cities soon followed the example, and a private company opened water-works in Berlin in 1856; it was not until 1873 that the city erected its own works. At present all the large and many of the smaller cities of Germany have their own waterworks—and private companies have gone entirely out of existence. power-plants were introduced at the expense or at the instigation of the city about 1880. These three undertakings, water, gas and electric works, form a very great source of revenue for cities, and indeed they often form the only important item in the receipts of many municipalities. Many other municipal institutions such as cemetries, market halls, flaving yards, loan offices, &c., are not as a rule very profitable institutions with the exception of savingsbanks.

Great progress has been made during the last generation in underground construction. Increase of traffic as well as care for the public health are constantly making fresh demands. By constant improvement of sanitary conditions the rate of mortality has decreased very considerably. Statistics show that the death rate in Munich in the year 1894 was 6,400 less than the number at which it was estimated on the basis of the average mortality during the years 1871–75. Great attention is paid to the care of the streets, their clean appearance, the rapid removal of rain water by sewers, and flushing away the dirt wirth a plentiful supply of clean water; anyone judging objectively will not deny the benefit of these efforts, as through the German cities have won the repute of having the cleanest cities on the continent of Europe. In the construction of bridges, sluices, and the building of canals, the German technologist claims both originality and success.

There still remain comprehensive architectural and artistic problems to be solved by German municipal councils. From time immemorial the town hall has represented the dignity of the city. It should be fitted up with well ventilated council rooms and light large, and airy working rooms for the adniinistrative officers, and be situated in a market place or other prominent position, as well as agree with the general appearance of the city; all in all, a task beset with many difficulties to be met and overcome by the architect. In spite of all this many of the new town halls in German cities thoroughly comply with these conditions. Besides the city hall as the most important building of the city, there are many other buildings serving different purposes, such as museums, theaters, schools, markets, baths, police, administrative buildings and fire-stations, hospitals and asylums, &c. Each one of these requires special architectural construction to meet its requirements. The rapid growth of the cities has greatly developed building activity. New artistic principles have been established during the last few years, and those persons who visited the Dresden Exposition were astonished to see the great variety of form and the marked individual character of architecture that many of the cities showed. As a mark of the increasing prosperity of the last ten years, renewed importance has been attached to the interior construction of houses, stairs, corridors, walls, doors, &c. The city of Munich is far ahead of any other German city in its schools, public baths, and in artistic interior decoration. Cities are also patrons of the small industries. They require diplomas and gold medals for awards, and attach great worth to the old city treasures of gold and silver, and add to them if possible. The highest city officials wear chains of gold and silver on all state occasions.

A comparatively new element making itself evident in German cities is the establishment of museums, which become the center of all that concerns the history of the city, and which also aim at collecting works of art.

Formerly it was the custom of royal courts to develop horticulture, and now the cities begin to do so more and more. They do not limit themselves to promenades, parks, and squares, but where there is room plantations are formed around the hospitals, slaughter houses, and particular

attention is paid to the laying out of cemeteries, so that everyone is able to share in nature's gifts, and the city is beautified.

Since the foundation of the German Empire the cities have broken their old bonds, and are no longer simple governing bodies clinging to historical traditions, or only executing what the state initiates. They have a higher goal, as they stand in mutual relationship with everything which denotes progress. They aim at representing German civilisatory endeavours of the present day. They do not desire to stand aloof from the people, but among them.

This ideal is of course only attainable if the municipal authorities are conformable and adaptable. They must be able to follow the manifold progress of the inhabitants, and are able to do so owing to their organisation. The basis for all this was laid down in the great Stein-Hardenberg period. It contained the principles of the co-operation of municipal government with the people, and the close connection between professionally trained officials of the co-operative body and prominent citizens. The fact acknowledged throughout the civilised world that German city government is not bureaucratic is largely to be attributed to the popular element infused into it. This is also recognised abroad. Edmund J. James writes as follow:*) "The common motion that Prussia is governed by a bureaucracy is nowhere more strikingly refuted than in the city administration, and one may say in local administration in general. In no large country of the world is greater care taken to provide that a decision, so far as it involves the question of expediency in any important public matter, shall not be made by one man, than in the Kingdom of Prussia. The whole spirit of the Stein and Hardenberg reforms involved, in one direction at least, the active participation of the lay element as distinct from the professional element, in the administration of public affairs, and this principle has found the most extensive application in every department of local government in Prussia. Nothing can be done in the sphere of civil administration except by boards which contain to a large extent a lay element, that is a non-professional element."

Of the extended activity of the administration in German cities very little is evident. When, at the instigation of Oberbürgermeister Beutler supported by the hearty co-operation of the German cities the first City-Exposition was opened in Dresden 1903, this was shown in a surprising manner. It had not been excepted either that the Exposition would attract many visitors or find general acknowledgment, but throughout Germany the Exposition was regarded as unique. The number of visitors increased from month to month. For the first time an extended picture of municipal government was unrolled before the world, and a deep impression was made on everyone by this insight into a domain usually closed. In order to preserve a lasting impression of the exhibits, a book has been compiled by the under-

^{*)} Edmund J. James: Municipal administration in Germany as seen in the government of a typical Prussian city, Halle-on-the-Saale, Chicago, 1901. The University of Chicago studies in political science. P. 17, &c.

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signed on the subject entitled "Die deutschen Städte" with the assistance of a number of government officials and professors, at the express desire of the Exposition authorities (published by Friedrich Brandstetter, Leipsic, 1904).

The tasks at present before the German cities are imposed firstly by the, increase of population, secondly by the form of present day economics. These are the problems with which nearly every civilised nation has to cope with. The German cities in the present exhibition show what they are now doing to promote public welfare.

Robert Wuttke.









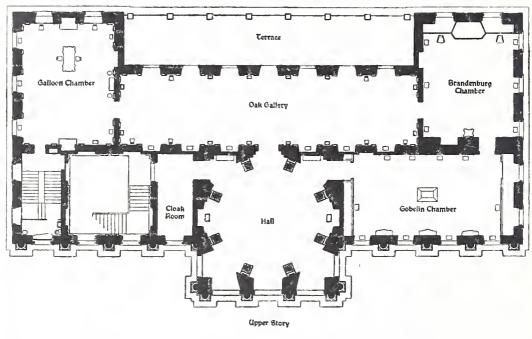


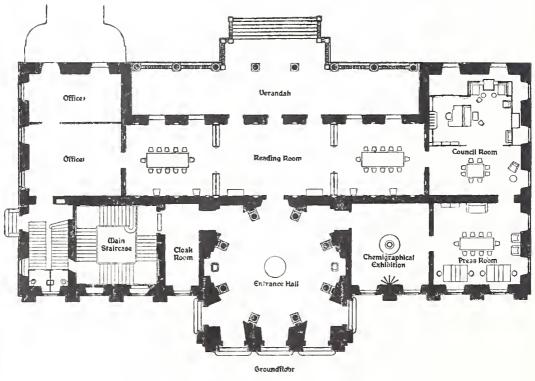


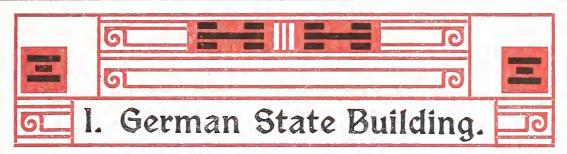


LIST OF EXHIBITORS

The German State Building at St. Louis.







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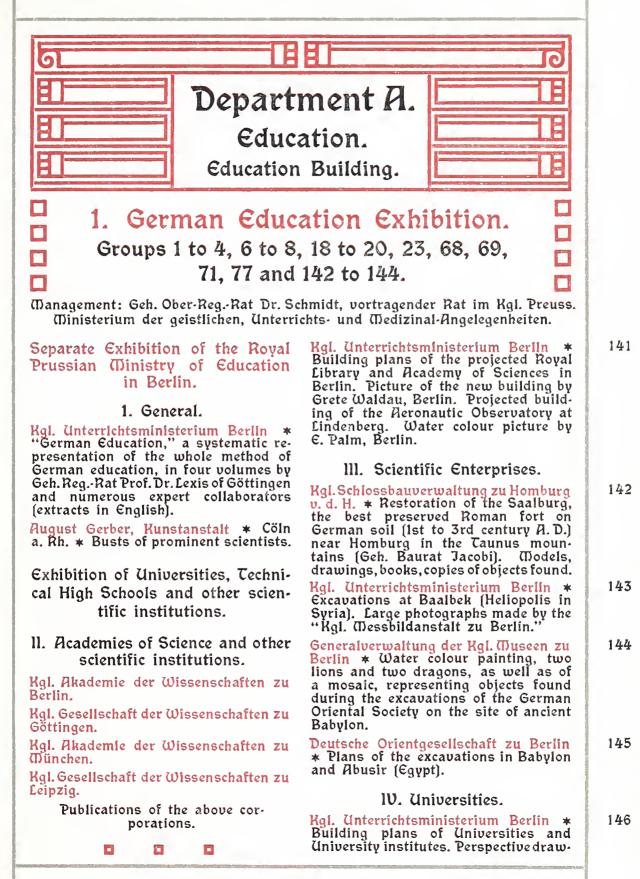
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692	€.Leitz, Optisch-mechanische Werkstätte * Berlin * Microscopes.	Pharmakologisches Institut der Universität Berlin (Direktor: Geh. MedRat	706
693	Grossherzogl. Hess. Obermedizinalrat Lorenz, Veterinärreferent im Ministe- rium des Innern * Darmstadt * Pam-	Prof. Dr. Liebreich) * The first curatives physiologically investigated in the Pharmacological Institute.	
	phlets concerning vaccination, instru- ments and sera for vaccination, gra- phic representations about the spread of swine fever.	Neurobiologisches Universitätslabora- torium Berlin * Waps of brain anatomi- cal methods. Wall tables and diaposi- tives about the anatomy of the brain.	707

708	Universitätsaugenklinik Breslau (Direktor: Geh. MedRat Prof. Dr. W. Uhthoff) * Stereoscopic-medical atlas of ophthalmology; stereoscopic diapositive; Petzold's red green diapositive with red green spectacles; model of a	patent 126,353); Messter's kinematographic camera for serial photography (German patents 127,913 and 127,543—American patent 698,125); examples taken of interesting nerve-cases. E. Ad. Müller Söhne * Wiesbaden *	719
709	Heyne's projection apparatus. Psychiatrischeund Nervenklinik der Universität Klei (Direktor: Prof. Dr. Siemerling) * Preparations (brain sections).	Artificial eyes as protheses and educational appliances; established in 1860; fifteen assistants; ten distinctions conferred, one bronze, seven gold, and two large medals.	
710	Psychiatrische Klinik Giessen (Direktor: Prof. Dr. Sommer) * Plans and sketches of small institutions for the treatment of physical disturbances; instructional text books of psychiatry.	Privatdozent Dr. Ludwig Neumayer * München * Model of a skull. M. Petzold, Spezialgeschäft für Photographie * Chemnitz, Langestr. 23 *	720 721
711	Orthopädisch-Chirurglsche Klinik von Dr. Fopp und Dr. Eckstein * Berlin W., Steglitzer Str. 10 * Photographs of results of paraffin-prothesis; injection syringe.	Diapositive for projection with stereoscopic effect; own patent. Carl Zeiss, Optische Werkstätte * Jena * Microscope with apparatuses for projection and microphotography.	722
712	Dr. Hermann Gutzmann * Berlin W., Schöneberger Ufer 11 * Apparatus for demonstration of the movements of the soft palate in speaking.	Exhibition of elementary and secondary education.	
713	Dr. Walter Thorner, Physician * Berlin, Wilhelmstr. 118 * Diapositive of photographs of the back of the living eye.	XIII. High Schools ("Gymnasiums" and "Realschools" including Cadet Academies).	
714	F. L. Flscher, Fabrik für chlrurgische Instrumente, Operationsmobilien und Krankenhausbedarf * Freiburg i. B. * Models and manikins.	Kgl. Joachimsthalsches Gymnasium zu Berlin W. (Alumnat).	723
715	Paula Guenther * Berlin W., Bülow- strasse 20 * Medical tables and drawings.	Kgl. Landesschule zu Pforta (Alumnat). Kgl. Auguste-Viktoria-Gymnasium zu Posen.	724 725 726
716	Fritz Kolbow, Sculptor * Berlin, Flem- mingstr. 6 * Forty-five wax and plaster models of original preparations, cast	Kgl. Gymnasium zu Wongrowitz. Städtisches Goethe-Gymnasium zu Frankfurt a. M. (Reformsystem).	727
	and coloured from nature; silver medal of the Royal Ministry of Public Instruction of Prussia.	Städtlsches Realgymnasium zu Elber- feld. Städtisches Realgymnasium zu Barmen	728 729
717	Louis & H. Loewenstein * Berlin N. * Manufacture of surgical instruments and electric medical appliances, established 1872. Exports to all civilized countries.	(Reformsystem). Städtisches Realgymnaslum "Wusterschule" zu Frankfurt a. W. (Reformsystem). Städtische Oberrealschule zu Bochum.	730
	Special department for reconstruction, connected with internal lighting of the body, and delicate machinery. Two Royal Prussian State Medals in silver among many other distinctions. Latest	Evangelisches Pädagoglum zu Godes- berg a. Rh. (Realschule und Progym- nasium—Privatanstalt, Alumnat).	732
	award gold medal from the World's Fair in Paris in 1900.	Städtische II. Realschule zu Berlin N., Weissenburger Str. 4a.	733
718	Messters Projektion, G.m.b. H. * Berlin SW. * Special house for construction of the Messter Kinematograph; machine for kinematographic projection (German patent 127, 913) with protecting	Städtische Realschule zu Kreuznach. Kgl. Kadettenanstalten (Lehrplan des Realgymnasiums). Deutsche Auslandsschulen zu Antwerpen, Brüssel, Bukarest und Konstan-	734 735 736
	apparatus in case of fire (German	tinopel.	

The exhibits of these establishments comprise pictures, photographs, sketches and plans of the school buildings, descriptions of the rooms with pictures of the life at the schools and of scholars, specifications of the teaching system and the various methods of organisation of the staff, time-tables, arrangement of instruction, domestic and household matters, and details of inspection by government authorities, attendance, and choice of professions, together with specimens of work done, exercise books, examination papers, methods of examination and qualifications.

XIV. Elementary schools, boardschools, intermediate schools, highschools for girls, teachers' training schools, and schools for children with defective senses.

232. Knabengemeindeschule zu Berlin SO., Glogauer Str. 13-16.

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213. Mädchengemeindeschule zu Berlin NO., Christburger Str. 18.

Dorfschule (einklassige Volksschule) zu Datum-Nienhöfen, Kreis Pinneberg (Provinz Schleswig-Holstein).

Knabenmittelschule (Arndt-Schule) zu Stettin.

Erste Mädchenmittelschule zu Stettin. Kgl. Augusta-Schule mit Kgl. Lehrerinnenseminar zu Berlin SW., Kleinbeerenstr. 16–19.

Städtische Sophien-Schule (Höhere Mädchenschule mit Gymnasialkursen für die weibliche Jugend) zu Hannover.

Kgl. Schullehrerseminar zu Ziegenhals. Kgl. Lehrerinnenseminar zu Burgsteinfurt i. W.

Kgl. Blindenanstalt zu Steglitz (Berlin). Städtische Taubstummenerziehungsanstalt zu Frankfurt a. (D.

Städtische Idiotenanstalt Berlin-Dalldorf.

The exhibits of the above establishments include pictures, photographs, sketches and plans of the school buildings, descriptions of the rooms with pictures of the life of the school and scholars, specifications of the teaching system and the various methods of organisation of the staff, time-tables, arrangement of instruction, domestic and household matters, particulars of government inspection, together with

specimens of the work done, exercise-books, examination papers, methods of examination and qualifications, as also results of training in handicrafts, and work done by the blind.

XV. Schools exhibit of German Towns.

(See grp. 141 p. 502.)

The following municipalities are exhibitors:

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Barmen. Berlin. Rielefeld. Bochum. Breslau. Charlottenburg. Chemnitz. Darmstadt. Dresden. Düsseldorf. Eisleben. Elberfeld. Frankfurt a. (D. Hamburg. Hannover. Hildesheim. Hörde. Kassel. Königsberg i. Pr. Kreuznach. Leipzig. Mainz. München. Nürnberg. Posen. Quedlinburg. Stettin. Stolp (Pommern). Strassburg i. E. Stuttgart.

The exhibits of the above towns comprise models and pictures of school buildings, gymnasiums, school gardens, play grounds, plans of sites, sketches, plans, and photographs, as also official reports, festival programmes, school work, examples of skill in handicraft and industrial training, and pictorial descriptions of schools preparing for special professions, school workshops and museums.

	XVI. School books, pedagogical	Founded 1783. Modern languages. Scientific literature. Hassiaca. G. Kön-	
	treatises, literature of the history of education, and school organisation.	necke's pictorial atlas of the history of German literature, second edition, with	
779	Amthorsche Verlagsbuchhandlung * Leipzig * Speciality: naturally colored wallpictures for instruction in natural history; popular works on natural	2,200 illustrations and fourteen artistic plates. A. F. C. Vilmar's history of German national literature, twenty-fifth (jubilee) edition of about 130,000 copies.	
780	history. Aschendorffsche Buchhandlung * Mün-	Gustav Fischer, Verlagsbuchhandlung * Jena, Selliner Str. 8.	79
	ster, Westphalia * Established 1763. Publishers of the "Münster Anzeiger"	Buchhandlung Gustav Fock, G.m.b.H. * Leipzig, Schlossgasse 7.	79
	and "Volkszeitung" now in their fifty-first year (circulation 30,000), of the "Theological Review" in its third, and "Natur und Offenbarung" in its fiftieth year. Speciality: school editions of German and foreign classics.	Förster & Borrles * Zwickau i. Sachsen * Publishers and art-printers, founded 1881. 115 workmen. Specialities: industrial artistic printing in three colours, posters, paper money, cards of congratulation, schedules, diplomas,	79
781 782	A. Asher & Co., Verlagsbuchhandlung * Berlin W., Unter den Linden 13. C. H. Becksche Verlagsbuchhandlung,	&c. awards: Chicago 1893, State medal Dresden 1896, Leipzig 1897, and gold medal Paris 1900. One copy of (Dichael's	
	Oskar Beck * München, Wilhelmstr. 9.	work on Fungi, in two volumes.	
783	Chr. Belsersche Verlagshandlung * Stutt- gart, Augustenstr. 13.	G. Freytag, Verlagsbuchhandlung * Leipzig, Brüderstr. 23.	79
784	Hermann Böhlaus Nachf., Inh.: Gerhard Dommering u. Albert Hartung *Weimar, Kleine Teichgasse 6.	B.W. Gebel, Verlag, Inh.: Bruno Gebel * Gross-Lichterfelde, Sternstr. 49.	79
785	Gebrüder Bornträger, Verlagsbuchhandlung * Berlin SW. 11, Dessauer Str. 29.	Hermann Gesenius, Verlagsbuchhand- lung * Halle a. S. * Founded 1861 at Bremen. Chief publication Dr. F. W.	79
786	Friedrich Brandstetter * Leipzig, Ste- phanstr. 20.	Gesenius' text book of the English language, and Professor Regel's arrange-	
787	J.G.Cotta'sche Buchhandlung Nachfolger G.m.b.H. * Branch establishment Berlin SW.12,Kochstr.53, in connection with the "Bessersche Buchhandlung" of W. Hertz.	ment of same. The first edition of this work appeared in 1864, since when 535,000 copies of various editions have been sold.	
788	Deutsche Dichter-Gedächtnis-Stiftung * Hamburg-Grossborstel, Violastr. 16.	G.J.Göschensche Verlagsbuchhandlung * Leipzig, Salomonstr. 10.	79
789	Moritz Diesterweg, Verlagsbuchhandlung * Frankfurt a. M. * Founded 1860.	Lucas Gräfe & Sillem * Hamburg, Kaiser-Wilhelm-Str. 82.	80
	Bangert's phonetical spelling book, seventh and eighth editions, with two	F. G. L. Gressler, Schulbuchhandlung * Langensalza.	80
	editions of notes. Also Schäfer and Krebs biblical reading book, third and sixth editions.	G. Grote'sche Verlagsbuchhandlung * Berlin SW.11, Dessauer Str. 18.	80
790	Dürrsche Buchhandlung * Leipzig * Founded 1755. (Ed. Peters publishing	J. Guttentag, Verlagsbuchhandlung * Berlin W. 35, Lützowstr. 107/108.	803
	business acquired in 1903). Principal publications are literature for the "Seminar," school books for "Volksschulen" and increasing heads for "Paul	Friedr. Aug. Herbig * Berlin W. * Verlagsbuchhandlung. Founded 1821. Instruction books for modern languages.	804
	len," and instruction books for "Real- schulen." Philosophy and theology. The publications exhibited represent very fairly the main object of the business, which is to further the education of German school teachers.	R. Herrosé's Verlag * Wittenberg * Central publishing office of the combined movement of secondary schools. Founded 1858. Awards at four exhibitions.	80
791	Friedrich Ebbecke, Verlag * Lissa i. P., Warkt 25.	Max Hesses Verlag * Leipzig, Erlen- burger Str. 4.	806
792	n. 6. Elwertsche Verlagsbuchhandlung	Hermann Hillger, Verlag * Berlin W.,	80

808	Ferdinand Hlrt, Kgl. Universitäts- und Verlagsbuchhandlung * Breslau VI, Königsplatz 1.	Practical information, advice and opinions. Professor Cohn's table for testing condition and sharpness of eyesight.	
809 810	Verlagsbuchhandlung A.W. Kafemann * Danzig, Ketterhager Gasse 4. J. M. Kerns Verlag (Max Müller) *	Rengersche Buchhandlung, Gebhardt & Wilisch * Leipzig * Verlagsbuchhandlung. Founded 1680. Edition of modern	827
	Breslau * Krause-Nerger's German grammar for foreigners; large edition, and edition for schools.	languages for reading. Text-books and primers for advanced schools. Scientific cyclopædia.	
811	K. F. Koehler, Verlagsbuchhandlung * Leipzig, Täubchenweg 21.	Rossbergsche Verlagsbuchhandlung * Leipzig * Bierbaum's French and Eng-	828
812	Gerhard Kühtmann, Verlagsbuchhand- lung * Dresden * Founded 1887. Edu- cational and instructional publications.	lish "reform" text-books. Reform library of modern languages. (Collection of school editions with notes and text in the same language.)	
813	Prof. Dr. Hermann Landois * Münster i. W., Tuckesburg, Zoologischer Garten.	Emil Roth, Verlagsbuchhandlung * Pedagogic publications. Text-books and	829
814 815	Langenscheidtsche Verlagsbuchhand- lung (Prof. G. Langenscheidt) * Berlin SW. 11, Hallesche Str. 17. F. Leineweber, Verlagsbuchhandlung *	exercises in language teaching, German, French, English, Italian, Dutch, and Spanish. Reading-books. Pictures of the Holy Land. Wall-maps.	
816	Leipzig, Könneritzstr. 57. C. C. Weinhold & Söhne, Kal. Hofbuch-	Dr. Theodor Scheffer, Verlagsbuchhand- lung * Leipzig, Nostitzstrasse 19.	830
817	druckerel und Lehrmittelverlag * Dresden, Zinzendorfstr. 29. Carl Meyer (Gustav Prior), Verlagsbuch-	Moritz Schnetter, Verlagsbuchhandlung * Berlin W. 57, Steinmetzstr. 36 *	831
818	handlung * Hannover. E. S. Mittler & Sohn, Kgl. Hofbuchhand	Publishing office of "Der Hauslehrer." J. F. Schreibers Lehrmittel- und Verlags-	832
	lung * Berlin SW. 12, Kochstr. 68-71.	buchhandlung * Esslingen bei Stuttgart, und München.	
819	Erwin Nägele, Naturwissenschaftlicher Verlag * Stuttgart * Schmeil's textbooks of botany and zoology, and de- monstration tables for botanical and	Schulhaus-Verlag * Berlin-Tempelhof * "Das Schulhaus," periodical edited by Karl Vanselow.	833
	zoological instruction. Hoffmann's il- lustrated botanical atlas, Hoffmann's	Karl Sleglsmund, Verlagsbuchhand- lung * Berlin SW.11, Dessauer Str. 13.	834
	flora of the Alps, and Wagner's flora withillustrations. Tables from Schmeil's text-book of botany.	Franz Siemenroth * Berlin W., Denne- witzstr. 2.	835
820	August Neumanns Verlag, Fr. Lucas * Leipzig, Querstr. 16.	Otto Spamer, Verlagsbuchhandlung * Leipzig, Breitkopfstr. 7.	836
821	L. Oehmigkes Verlag, R. Appelius * Berlin NW. 7, Dorotheenstr. 38/39.	Gerhard Stalling, Verlag * Olden- burg i. Gr.	837
822	Berthold Otto * Gross-Lichterfelde, Hol- beinstr. 25 * Publisher of the children's paper "Der Hauslehrer."	Elwin Staude * Berlin W.35 * Litera- ture dealing with the education of the deaf and dumb, stammering and its cure, and other books of instruction on	838
823	Hermann Paetel, Verlag * Berlin W., Elssholzstr. 12.	the same subject. Also a childrens' paper, "Deutsche Jugendpost."	
824	A. Pichler's Witwe & Sohn, Verlags- buchhandlung * Wien und Leipzig.	Strassburger Druckerel und Verlags- anstalt, vorm. R. Schultz & Co. * Strass-	839
825	Preuss & Jünger, Buchhandlung * Breslau * Calendar of the system of secondary education obtaining in Prussia and several towns in other parts of Germany. Current edition for 1903	burg i.E. Franz Vahlen, Verlagsbuchhandlung * Berlin W. * David Müller, publisher, History of the German People.	840
826	Germany. Current edition for 1903. Priebatschs Buchhandlung. Lehrmittel- institut * Breslau * Teaching appliances for German schools, three volumes.	L. v. Vangerow * Bremerhaven * Publisher of Kleyer's Encyclopædia of the mathematical, technical and exact natural sciences. Various awards.	841

842	Velhagen & Klasing, Verlagsbuchhand- lung * Bielefeld und Leipzig.	G. Freytag & Berndt * Wien, Schotten- feldgasse * Atlases, maps.	855
843	Friedr. Vieweg & Sohn, Verlagsbuch- handlung * Braunschweig, vor der Burg 18.	Ferdinand Hirts Verlag * Breslau und Leipzig * School wall maps, object pictures.	856
844	R. Voigtländers Verlag * Leipzig * Pedagogics, Art. Specially to be mentioned R. Voigtländer's coloured stone	Hobbling & Büchle, Verlagsbuchhandlung * Stuttgart, Paulinenstr. 19 * Wall maps, some showing how to use maps.	857
845	drawings (Gold medal, St. Petersburg 1904). Leopold Voss * Hamburg, Hohe Blei-	Ed. Hölzel, Verlag * Wien, Luisengasse 5 * Wall maps for intuitive instruction in geography and other branches, maps, &c.	858
846	chen 34. Buchhandlung des Walsenhauses In Halle a. S. * Established 1698. Works concerning pedagogics: Education and Instruction, legislation for schools,	Fritz Kindt * Steglitz bei Berlin * Geo- graphical institute. Relief of Vesuvius 1:20,000 of natural length; Relief of the Riesengebirge. K. F. Koehler, Verlagsanstalt * Leipzig *	859 860
847	school books, object pictures. Weidmannsche Buchhandlung * Berlin	Maps. Dr. F. Krantz, Rheinisches Mineralien-	861
	* Magazines, text books and manuals for all branches of education at High Schools.	kontor * Bonn * Reliefs.	862
848	Publications about gymnastics, &c. George Westermann * Braunschweig *	Kartographische Verlagsanstalt von Georg Lang * Leipzig * School wall maps.	802
	Established 1838. Publishing and printing office, cartographic institute. Publisher of school atlases, wall maps, school books and dictionaries, and of Westermann's "Illustrierten Deutschen	€. Morgenstern, Verlagsbuchhandlung * Breslau VI, Königsplatz 1 * School wall maps for lectures on the German classics.	863
849	Monatsheften." Wlegandt & Grieben * Berlin SW.,	A.Müller-Fröbelhaus, Lehrmittelinstitut und Verlagsanstalt * Dresden-Wien *	864
1	Luckenwalder Str. 1.	Kuhnert-Leipoldt, School wall maps, simple relief.	
850	Winckelmann & Söhne * Berlin S. * Established 1828. Publishing bookseller. Educational appliances and school books.	Justus Perthes, Geographische Anstalt und Verlagsbuchhandlung * Gotha * Maps and atlases.	865
851	Hellmuth Wollermann, Verlagsbuch- handlung*Braunschweig, Bohlweg 13*	Rengersche Buchhandlung, Gebhardt & Wielisch * Leipzig * Plans of the town.	866
	Speciality: Evangelical Theology and Pedagogics. Harms's school wall maps and planispheres.	Emil Roth, Verlagsbuchhandlung * Giessen * Maps.	867
852	Max Woywod, Verlagsbuchhandlung * Breslau VIII, Klosterstr. 3.	ErnstSchotte&Co., Geographisch-artistl- sche Anstalt und Verlag * Berlin W., Potsdamer Str. 41a * Tellurion, plane-	868
853	Ernst Wunderlich, Verlag * Leipzig, Johannisgasse 11.	tarium, globes, &c. J. F. Schreibers Lehrmittelverlag * Ess-	869
	XVII. Geographical educational ap-	lingen bei Stuttgart, München * Wall pictures.	
	pliances (Atlases, maps, globes, relief maps).	E. A. Seemanns Verlag * Leipzig, Quer- strasse 13 * Wall pictures.	870
854	J. Dinges, Kgl. Seminarlehrer * (Dindel- heim (Bayern) * Publisher. Geographical	P. Stankiewicz, Buchdruckerei * Berlin, Bernburger Str. 14 * Illustration of a qeological section.	871
	relief maps for school and general edu- cational purposes. (Orders undertaken	Velhagen & Klasing, Verlag * Bielefeld und Leipzig * Atlases.	872
	for relief work.) 13 sections of the northern calcareous Alps, relief of the entire Alps, relief of Europe with natural	F.E. Wachsmuth, Kunst-und Schulbilder- verlag * Leipzig * Estb. 1872. Publisher	873
	curvatures in earth. Relief of a typical Bavarian highland.	of artistic and coloured object tables, comprising all branches of modern	

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	education. Also publisher of coloured pictures at the cheapest prices, for decorating school rooms and dwellings.	Ephralm Greiner * Stützerbach in Thüringen * Appliances for instruction in physics. See: Scientific instruments.	885
	1st prize awarded at all international Expositions. Representative in every capital of the world.	Albert Hauff, Verlag * Berlin-Schöne- berg, Cheruskerstr. 2 * Lamey's calcu- lating apparatus.	886
874	H. Wagner & E. Debes, Geographischer Verlag * Leipzig * Hand and school atlases, school wall maps.	Ed. Hölzel, Verlag * Wien, Luisengasse 5 * Object pictures for instruction in languages.	887
875	George Westermann, Verlag * Braunschweig * Atlases and school wall maps.	A.W.Kafemann, G.m.b.H., Verlagsbuch- handlung und Buchdruckerei * Danzig * Four object pictures by Kafemann:	888
876	Winckelmann & Söhne * Berlin S., Se- bastianstrasse 34 * Geographical object pictures.	Spring, Summer, Autumn, Winter. 2. Edit. 1900. Prize awarded at the Int. Exp. Chicago 1893. Spelling books and school	
877	Hellmuth Wollermann * Braunschweig, Bohlweg 13 * Harms' school wall maps and planispheres.	books for national schools. J. Kagerah * Hamburg * Verlag technologischer Lehrmittel. Established 1896. Samples showing the treatment of the most important raw materials. Internat.	889
	XVIII. Educational appliances (models, apparatuses, object	Educat.Exp.Santiago de Chile 1902/1903: 1st prize. Hamburg 1903: Silver medal.	
	pictures, &c.). Elementary, natural-science, phy-	K. F. Koehler, Verlagsanstalt * Leipzig * Object pictures for instruction in ancient languages and history.	890
	sical, technological, mathema- tical instruction, &c.	Dr. F. Krantz, Rheinisches Mineralien- kontor * Bonn * Models of crystals, minerals, gyps models.	891
878	Amthorsche Verlagsbuchhandlung * Leipzig, Talstr. 5 * Object pictures for botanical and zoological instruction.	UnivProf. Dr. Hermann Landois * Münsteri.W.*Anatomical preparations.	892
879	A. Böttcher, Naturalien- u. Lehrmittel- hdlg. * Berlin C., Brüderstr. 15 * Export to all civilized countries. Natural science educational appliances: Anthropology, Zoology, Botany, Mineralogy, Geology, Technology.	Leppin & Masche, Fabrik wissenschaft- licher Instrumente * Berlin SO., Engel- ufer 17 * Collection of physical appa- ratuses of a Berlin board school. See: Scientific instruments.	893 894
880	R. Brendel * Grunewald (Berlin), Bismarckallee 37 * Models for instruction in Botany in schools, agricultural and forestry colleges, universities, &c.	C. C. Deinhold & Söhne, Kgl. Hofbuch- druckerei und Lehrmittelverlag * Dres- den * Established 1777. Education appliances introduced in German, Aus- trian and many foreign schools; re-	034
881	Friedrich Ebbeckes Verlag * Lissa i.P. * Establ. 1826. Speciality: manufacture of educational appliances for instruction in reading and writing, text books for the two language national schools.	commended by the highest school authorities; made in own establishment: Specialities: Object pictures, animal pictures, anat. wall illustrations, &c. See: Special Catalogue of the German	
882	Gustav Fischer, Verlag * Jena * Ana- tomical wall illustrations.	Education Exhibition. Erwin Nägele, Verlagsbuchhandlung *	895
883	Th. G. Fisher & Co. * Kassel * Wall illustrations for instruction in natural science at High schools and Universities. Westrations from Wiggand's Acro-	Stuttgart * Botanical and zoological wall illustrations. See: Section Text books. Friedrich Andreas Perthes, AktGes. * Gotha * Object pictures of the Saalburg.	896
	ties. Illustrations from Wiegand's Acro- polis at Athens.	Kehr-Pfeiffer's pictures of fables.	207
884	Paul Gebhardt Söhne * Berlin C. * Manufactury of physical school apparatus and laboratory fittings. Apparatuses for High schools. See also Section of Ministry of Agriculture.	Gebr. Pippow * Hermsdorf (Mark) * Supply all zoological educational appliances. Catalogue gratis. Gold and silver medals awarded at the Int. Exp. Chicago 1893.	897

898	Wilhelm Plessmann, Münchener Lehr-	b) Patterns (models) for in-	
	mittelhandlung * Dünchen * Trans-	struction in drawing, artistic	
	parency of the Northern firmament.	wall decorations, sculptures,	
899	F. E. Wachsmuth, Schulbilder- u. Kunst- verlag * Leipzig * Pictures representing	busts and portraits.	
	the history of civilisation; botanical, zoo-	Albrecht-Dürer-Haus Sütterlin & Schöll,	923
	logical, technological wall pictures, &c.	Kunstzentrale für Schule und Haus * Berlin, Kronenstr. 18 * Artistic wall	
	See advertisements p. 13.	decorations, instructional appliances	
900	G. Winckelmann, Buchhandlung u. Lehr-	for drawing. Art enterprise with the	
	mittelanstalt * Berlin SW., Friedrich- strasse 6 * Movable geometrical	tendency of spreading good and in-	
	models, collections of woods and in-	expensive art in wide popular circles; has assisted in the spread of the reform	
	sects.	proposed in drawing instruction by the	
901	Winckelmann & Söhne * Berlin S., Se-	Prussian Ministry of Education, by	
	bastianstr. 34 * Pictures for object lessons and instruction in languages.	exhibiting and spreading the new appliances required, which are mostly	
	ressons and instruction in languages.	made after own models. Representatives	
	VIV Section for drawing and	of the Natural History Institute "San-	
	XIX. Section for drawing and	ders Präparatorium," Cöln a. Rh. Gold	
	artistic decoration of walls.	medal awarded at Int. Exp. "Kinder- welt," St. Petersburg.	
	a) Pupils drawings supplied by the following establishments:	Breitkopf & Härtel, Verlagsbuchhand- lung * Leipzig.	924
902	Knabenvolksschule zu Hannover-Linden.	Wilhelm Fechner, Photographisches Ate-	925
903	Höhere Töchterschule 1 zu Hannover.	lier * Berlin W., Potsdamer Str. 134a.	
904	Höhere Töchterschule der Franckeschen Stiftungen zu Halle a.S.	August Gerber, Deutsche Zentralstelle für klassische Skulpturen, Statuen,	926
905	Kgl. Augustaschule mit Kgl. Lehrerinnen- seminar zu Berlin.	Büsten, Reliefs der Antike, des Mittel- alters und der Neuzeit, Kunstanstalt * Cöln, Domkloster 3.	
906	Kaiserin-Auguste-Viktorla-Schule zu Stettin.	Gesellschaft zur Verbreitung klassischer Kunst, G. m. b. H. * Berlin * Wall de-	927
907	Kgl. Schullehrerseminar zu Bromberg.	coration collection of masterpieces of	
908	Kgl. Schullehrerseminar zu Delitzsch.	classical art in copper plate printing.	
909	Kgl. Schullehrerseminar zu Reichen- bach OL.	Hausmann & Latwesen * Kassel, We- serstr. 21.	928
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2. Single groups. A. Stehr, chief engineer. Group 1. W. Lerche, first officer. R. Vahsel, second officer. Elementary education. L. Ott, second officer. See German hygienic exhibit, p. 494. Crew of twenty-two men. Dr. Jessen * Strassburg i. E. * a) Wall In addition, for the observatory at the illustrations "The teeth and their treat-Kerqueles: ment," b) "Sound and bad teeth," c) Dr. E. Werth, Biologist. School dental hospital, Strassburg i. E. J. Enzensperger 4, meteorologist. Dr. Jessen, Dr. Loos, Zahnarzt G. Schläger * Pamphlet "The hygiene of Dr. K. Luyken, terrestrial magnetician Crew of two men. teeth in school and army." Antarctic ship "Gauss" built at the Howaldt vard, Kiel, 1900/01. Length 46 meters, width 10.7 meters, draught Group 5. 4.8 meters. Triple-expansion engine of 325 h.p. Speed under steam 7 knots with cargo of 725 t, under sail up Special education in agriculture. to 9 knots. Rig: three masted_ship, (Agricultural building. See p. 478 and 479.1 schooner rigged with topsails. Model exhibited by the Howaldt yard, Kiel. Joint exhibit of furniture. Course of the expedition: investigations utensils and apparatuses for the at Sao Vicente, Cape Colony, Crozet chemical laboratory of an experi-Islands, Kergueles, Heard Island, St. mental farm. Paul, New Amsterdam, Cape Colony, St. Helena, Ascension and the Azoresb) Joint exhibit of the Royal four months in all. Prussian Ministry for agriculture, Investigations in the Atlantic and Inwoods and estates. dian Oceans, ten months in all, in the Antarctic Ocean fourteen months, of which time eleven and a half months Group 8. were spent at the winter station and on sledge journeys. Special forms of education; scien-Results: discovery of Kaiser Wilhelm II. tific expeditions. Land and the Gauss mountain; nume-Exhibited in Transport Building. rous scientific works and collections from the Antarctic regions, the different German Antarctic expedition. oceans and their islands. Duration 28 months, from August 11th 1901 to November 29th 1903. Exhibits: map of the course through the Antarctic Ocean, showing the winter Chief: Professor Dr. E. von Drygalski. station, photographs, natural products, registry curves, provisions, clothes, sledges, cayaks, snow-shoes and sport-Members: Prof. Dr. E. Vanhöffen, zoologist and botanist. ing articles. Dr.H.Gazert, doctor and bacteriologist. Provisions of the Expedition exhibited Dr. Fr. Bidlingmaier, terrestrial magby the "Internationale Schiffsbedarfsnetician. Gesellschaft." Carl Bödiker & Co., Dr. E. Philippi, geologist and chemist. H. Ruser, captain. Bremerhaven.

Department B. Art. (Palace of Fine Arts.)	
1. German Art Exhibition.	
Groups 9 to 12. Artistic arrangement of rooms: Prof. Kreis, Dresden.	
Artistic arrangement of the secretary's office: G. v. Mayenburg, Architect, Dresden.	
Group 9. Carl Bloss* München * "Portrait of the artist."	1042
Paintings and Drawings. Theodor Bohnenberger * München * "Chesnut blossoms."	1043
"Low Water," owned by Eduard Schulte, Düsseldorf. H. Bohrdt * Berlin * "Opening of the Kaiser Wilhelm Canal," owned by National Gallery, Berlin.	104
"Sea at Sunrise." 2. Arch fo Constantine at Rome," owned by National Gallery, Gallery Berlin. 3 "Pemi Lake" owned Berlin.	104
by Mr. Ed. Schulte, Düsseldorf. Julius Adam * München * "Large A. Braith * München * 1. "Irmgrich." 2. "Joyful morning," owned by National Gallery, Berlin.	104
Family." Carl Albrecht * Hamburg * "Still-life." August von Brandls * Berlin * "Interior, peasant's sitting room, looking	104
Theodor Alt * München * "In Rud. Hirth's Atelier." Anders Andersen-Lundby * München * "Winter's day at Meizing." into bed-room, Lower Khine." Josef von Brandt * München * 1. "Swedish Cavalry in Battle," 2. "Fighting Tartars," owned by National Gallery, Berlin.	104
Alfred Bachmann * München * "Horse-	104
man in the evening Sun (Iceland)." Fritz Baer * (Dünchen * 1. "Stormy evening In the Highlands (Ferwall)." Georg Burmester * Kiel * "Fresh fallen snow" (Evening).	105
2. "The Kuchenspitze in Ferwall (Tyrol)." H. Baisch + Dresden * "Dortrecht at low water," owned by National Gallery, G. von Canal * München * "West-phalian Mills," owned by National Gallery, Gallery, Berlin.	105
Berlin. W. Clemens * München * "Poacher's End."	105
service in Hesse," owned by National Moritz Coschell * Berlin * "A Walk."	105
Hans von Bartels * München * 1. "The Mower," water colour. 2. "Breakers." Heinrich Basedow * Berlin * "Silver stream." "Council of War." 2. "Sleeping Child." 3. "Portrait of the painter Gysis." 4. "Tyrolese Landsturm returning in 1809," owned by National Gallery, Berlin. 5.	1054
Carl Becker * Düsseldorf * "Evening in fishing port." "Pilgrims." Konrad Dielitz * Berlin * "Woodmen."	105!
Karl Becker + * Berlin * "Charles V. at Fugger's," owned by National Gallery, Berlin. Wilhelm von Diez * München * 1. "Rest at the Ruins." 2. "Forest feast," owned by National Gallery, Berlin.	1056

	Fine Ares		
1057	Willi Döring * Berlin * "Portrait of Miss Victoria V."	Robert Forell * München * 1. "Death of Count Wilhelm of Mansfeld." 2. The	1077
1058	Eugen Dücker * Düsseldorf * "Seas at Stralsund," owned by the artist.	frame belonging to above, owned by the Kaiser Wilhelm Museum at Crefeld.	
1059	A. Echter * München * "After the Masquerade."	Alexander Frenz * Düsseldorf * "The golden era," owned by Kommerzienrat	1078
1060	Andreas Egersdörfer * Frankfurt a. (1). * 1. "In Holland." 2. "Wharve."	Dr. Schoenfelder, Düsseldorf. Victor Freudemann * Berlin * "German	1079
1061	Julius Chrentraut * Berlin * 1. "Strategists." 2. "Inspection." 1 and 2 from	Cemetery covered by snow." Richard Friese * Berlin * 1. "A difficult	1080
	the private apartments of H.J. (1). the Emperor.	Walk." 2. "Stag of twenty two points pursued by bloodhounds." 3. "Elk	1000
1062	Rudolf Eichstädt * Berlin * "Blücher in Genappe."	hunting in Winter." 2 and 3 owned by H. I. M. the Emperor. 4. "On the	
1063	Otto Heinrich Engel * Berlin * 1. "Sun- set." 2. "Evening. Fishing for had- docks." 3. "The Walk."	old wall," owner National Gallery, Berlin. Gebhard Fugel * (Dünchen * "Christ	1081
1064	Georg Herrmann Engelhardt * Berlin * "Upper Finster valley near Küchtal"	before the Sanhedrim."	
	(Tyrol).	Alexander Fuks * München * "Study."	1082
1065	Alois Erdtelt * München * 1. "Portrait of my father." 2. "Adorned for God," or "Confirmation Candidate." 3. "Girl's	M. Gaisser * München * "At the Lawyers," owned by the Munich Pinakothek.	1083
1066	Head." Richard Eschke * Berlin * 1. "The Spree	Eduard von Gebhardt * Düsseldorf * "The rich disciple," owned by the Municipal gallery of Düsseldorf.	1084
1067	near Leipe, Spreewald." 2. "Horse- radish fields near Leipe, Spreewald." Otto v. Faber du Faur + * München *	O. Gebler * München * "Art critics in the Stables," owned by National Gal-	1085
100.	1. "A Campaign." 2. "The Horses of the Emir."	lery, Berlin. Berthold Genzmer * Berlin * 1. "Spree-wald children." 2. "Curisch Girls."	1086
1068	Hanns Fechner * Berlin * 1. "Lady in Black." 2. "Theodore Fontane," owned by the town of Berlin.	Friedr. Geselschap + * Berlin * "Design of the Hamburg Town Hall," owned by the Municipality of Hamburg.	1087
1069	Louis Feldmann * Düsseldorf * 1. "Vision of St. Francis." 2. "Meeting at	Franz Grässel * München * "Ducks."	1088
1070	the crossways." Wilhelm Feldmann * Berlin * 1. "When	Peter Greeff * Düsseldorf * "Birches at the edge of the forest."	1089
1071	the mist rises." 2. "Evening country scene." 3. "Solitude in the Fields." Anselm Feuerbach + * Düsseldorf * 1. "Dante and the noble women." 2. "Con-	Eduard Grützner * München * 1. "Sir John Falstaff." 2. "Still life." 1 and 2 are only to be sold to a public gal- lery or museum.	1090
1072	cert," owned by National Gallery, Berlin. August Fink * München * "Winter eve-	Anna Gumlich-Kempf * Berlin * "To- matoes."	1091
1012	ning in the park of Nymphenburg."	Nikolaus Gysis * München * 1. "The	1092
1073	Walther Firle * (Dünchen * 1. "The Lord's Prayer" (Triptychon): a) "Give us this days our daily bread," b) "Thy will be done," c) "Forgive us our trespasses."	little Reader." 2. "Art and her geniuses." 3. "Pilgrimage." 4. "Negrowith cigarette." 1 and 2 owned by the Mayor of Munich.	
	1. a to cowned by the Munich Pina- kothek. 2. "Alone in the world."	Richard Hagn * Dresden * 1. "North Friesian peasants room." 2. "North	1093
1074	Adolf Fischer-Gurig * Dresden * "East Friesian Shipbuilding Yard."	Friesian peasant cottage." Willy Hamacher * Berlin * "Ruins by	1094
1075	Eudmilla von Flesch-Brunningen * Mün-	the Sea."	
1076	chen * "Anointment of young witches." P. Flickel + * Berlin * "Beech forest	Carl Hartmann * München * "Harvest time."	1095
1076	near Prerow," owned by National Gallery, Berlin.	Ernst Hausmann * Berlin * "Autumn Forest."	1096

1097	Otto Heichert * Düsseldorf * "In the sweat of thy brow shalt thou eat the bread."	Fritz August von Kaulbach * München * "Portrait of H. J. M. the Empress with Princess Victoria," property of the	1120
1098	Heinrich Heimes * Düsseldorf * "Fishing boats on the shore."	school mistresses Seminary at Droyssig. Carl Kayser-Eichberg * Berlin * "Even-	1121
1099	Ernst Henseler * Berlin * "The day's work ended."	ing sun before the Storm." Ferdinand Keller * Karlsruhe * 1."Por-	1122
1100	Hans Herrmann * Berlin * 1. "Flower- market, Amsterdam." 2. "Dutch Fishing village," property of the Royal National	trait of H. l. M. Emperor William II." 2. "Böcklin's Grave." 3. "Nymphs Bath."	1107
1101	Gallery, Berlin. August Herrmann-Allgäu * München * 1. "Pomegranates." 2. "Onions and	Conrad Kiesel * Berlin * 1. "Study in black." 2. "Portrait of Countess Matuschka," property of Mr. F. H. Walker, Detroit.	1123
1102	garlic." Johann Herterich * München * "Vain warning."	Paul Kiessling * Dresden * 1. "Decorative work." 2. "Portrait of the architect of the Niederwald monument" (Jo-	1124
1103	Ludwig Herterich * München * "The heroine of Lüneburg," property of the Lübeck Museum.	hannes Schilling). 3. "Study of head for a portrait" (Viceadmiral S.)	4405
1104	Carl Heyden * Düsseldorf * "Roofs"	Karl Knabl * München * "Voyage by rast on the Isar."	1125
1105	(Old Düsseldorf). Friedrich Heyser * Dresden * "Portrait of Professor Wislicenus."	L. Knaus * Berlin * "Wie die Alten sungen" (The young pigs grunt like the old sow), property of the National	1126
1106	Rud. Hirth du Frênes * (Dünchen * "Picture-book."	Gallery, Berlin. Hermann Knopf * München * "The	1127
1107	Franz Hoch * (Dünchen * "In cypress' shade."	Giant toy." Hans Koberstein * Berlin * "The Son," property of the Emperor William Mu-	1128
1108	Franz Hochmann * Dresden * "Autumn."	seum at Crefeld.	
1109	Franz Hoffmann-Fallersleben * Berlin * "The altar on the Oldenburg heath."	Ernst Koerner * Berlin * 1. "Torre del Agua" (Alhambra). 2. "The Memnons	1129
1110	August Holmberg * München * "Even- ing."	Colossus" (Upper Egypt). Alexander Koester * Karlsruhe * 1. "A	1130
1111	Carl Holzapfel * Kassel * "Finkenwärder fishing cutter on the Elbe at Hamburg."	flight of ducks." 2. "Picture of ducks" (in evening sun). 3. "At the duck pond."	
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1113	grove." (Dax Hünten * Düsseldorf * "Autumn	Alfred von Kowalski-Wierusz * Mün- chen * "After the Rain."	1132
1114	storm." Julius Jacob * Berlin * "Hafenplatz, Berlin."	Christian Kröner * Düsseldorf * 1. "Forest picture with roebuck," property of Kommerzienrat Dr. Schönfeld, Düssel-	1133
1115	Gerhard Janssen * Düsseldorf * 1. "Portrait of the artist." 2. "Toll und Voll."	dorf. 2. "Rivals," property of the artist. Carl Kronberger * München * "Woman from the Dachau district (Upper Ba-	1134
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1118	Friedrich Kallmorgen * Berlin * "The Maas at Rotterdam."	in Lübeck," property of the National Gallery, Berlin.	
1119	A. Kampf * Berlin * "Professor Steffens inciting to insurrection at Breslau in 1813," property of the Royal National Gallery, Berlin.	Carl Küstner * München * 1. "Winter Evening." 2. "March Day" (Moss landscape), property of the Munich Pinakothek.	1137

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1138	Wilhelm Kuhnert * Berlin * 1."Roaring Lions." 2. "On the Flight."	Hans Meyer * Berlin * "View of Wertheim a. M., Antumn."	1161
1139	E. Adam Kunz * München * 1. "Truth and Fiction."	Kunz Meyer * München * 1. "Parsifal." 2. "A warrior."	1162
1140 1141	Fritz Lang * Stuttgart * "Aquarium." Carl Langhammer * Berlin * 1. "Evening." ing." 2. "The Sun in a mist." Anton Laupheimer * München * "Holi-	Paul Meyerheim * Berlin * 1. "Charcoal burners in the mountains," property of the Hamburg Art Hall. 2. "Parade of Equestrians."	1163
1142	days."	Georg Ludwig Meyn * Berlin * "Frau von Cotta."	1164
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1144	W. Leibl + * Aibling bei Rosenheim * "Portrait of the Freiherr M. von Per-	Alfred Mohrbutter * Kiel * "Old Gehring."	1166
1145	fall," property of the Munich Pinakothek. Karl Lelpold * Kiel * "Mill in the	Paula Monjé * Düsseldorf * "Julia Capulet."	1167
1140	Marsch country."	Hugo Mühlig * Düsseldorf * 1." Stragg-	1168
1146	Franz von Lenbach * München * 1. "Frau Lilly Merk." 2. "Child with Cat." 3. "Dr. Hammacher."	lers at the Battue," property of Geh. Commerzienrat Dr. Schoenfeld." 2. "Spring," property of Miss Schleicher, Düren.	
1147	Konrad Lessing * Berlin * 1. "At the Neuhofer Pond." 2. "Twilight."	Richard Müller * Dresden * 1. "Old Woman." 2. "Man with fur cap."	1169
1148	Hermann von Le Suise * München * "November Evening."	Franz Wüller-Wünster * Berlin * "Ro- mance."	1170
1149	H. Liesegang * Düsseldorf * 1. "Autumn Grove." 2. "Dutch Mill."	Müller-Schoenefeld *Berlin * "Portrait of Frau St."	1171
1150	Clara Lobedan * Berlin * "Azalea, in red light."	Wilhelm Nagel * Karlsruhe * 1. "Falling Leaves." 2. "Winter Evening."	1172
1151	L. von Loefftz * München * "Orpheus and Eurydice," property of the Munich Pinakothek.	Eduard Niczky * "Springtime," pro- perty of Herr Ed. Schulte, Düsseldorf.	1173
1152	W. Löwith * München * "In the ante- chamber of the minister," property of the Munich Pinakothek.	William Pape * Berlin * 1. "Before the Sermon" (In the Sylt village church). 2. "A Death bed marriage."	1174
1153	K. Ludwig + * Berlin * "St. Gothard Pass," property of the National Gallery, Berlin.	Georg Papperitz * München * 1. "Lady in fur with a dog." 2. "Half length picture of a young girl," property of the Munich Pinakothek.	1175
1154	Adolf Männchen * Düsseldorf * "The hour of Death."	Anton Pepino * Dresden * "At the	1176
1155	Otto Marcus * München * "On the Mole at Concarneau."	Writing table," property of the town of Dresden.	147-
1156	H.von Marées* München * "St.George," property of the National Gallery, Berlin.	Hans von Petersen * (Dünchen * "Breakers."	1177
1157	Johannes Martinl * Berlin * "Break- fast in the locomotive workshop."	Walter Petersen * Düsseldorf * "Portrait of Prof. Emilie Sauret in Chicago."	1178
1158	Gustav Marx * Düsseldorf * "Over the red Heath."	Heinr. Petersen-Angeln * Düsseldorf * "At the entrance, near Yimuiden (Holland)."	1179
1159	Gabriel von Max * München * 1. "Florence," study of a head. 2. "Jesus	Peter Philippi * Düsseldorf * 1."A Visit." 2. "Winkelweisheit" (Corner wisdom).	1180
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1160	Adolf von Menzel * Berlin * 1. "Woman messenger," property of Geh. Commerzienrat Arnold, Berlin. 2. "Iron rolling mill." 3. "Departure of King	Hermann Emil Pohle * Düsseldorf * 1. "Success to Life." 2. "Girl with a Rose."	1182
	William for the Army in 1870," property of the National Gallery, Berlin.	Rudolf Possin * Berlin * "Head of an old man."	1183

1184	Otto Propheter * Karlsruhe * "Portrait of Prof. Ferdinand Keller."	G. Schönleber * Karlsruhe * "Enzwehr near Besigheim," property of the Natio- nal Gallery, Berlin.	1204
1185	Fritz Rabending * München * "On the Schlern (The Dolomites)."	Richard Scholz * Wünchen * "Portrait."	1205
1186	Prof. Wilhelm Räuber * München * 1. "Lady's Likeness (Frl. E.)." 2. "Death	Gustav Schraegle * Frankfurt a. M. * "Portrait of the artist."	1206
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1187	K. Raupp * München * "Peace," property of the National Gallery, Berlin.	Wilhelm Schreuer * Düsseldorf * 1. "Rest at posting station," property of (Dr. Constantin Luck. 2. "Hussars	1208
1188	Julius Rehder * Hamburg * "Child's likeness."	on the Heath," property of RechnRat Bauer.	1
1189	Woldemar Graf von Reichenbach * Dresden * 1. "Garden of the Capuchins at Salzburg." 2. "Drunken Silenus and	Albert Schröder * München * "Artistic Pause."	1209
1190	Faun." 3. "Gloria Doloris." Caspar Ritter * Karlsruhe * "Carmen."	Bernhard Schröter * Meissen *1. "Birches in Snow." 2. "The new coat of paint."	1210
1191	Theodor Rocholl * Düsseldorf * 1. "In the Enemy's Country." 2. "Count York's Expedition to Kalgan," property of the Dational College Roulin	Werner Schuch * Berlin * 1. "Seydlitz." 2. "Zieten." 1 and 2 property of the National Gallery, Berlin.	1211
1192	National Gallery, Berlin. Carl Röchling * Berlin * "Fishermen behind a Mill."	Raffael Schuster-Woldan * München * 1. "On an open Summit." 2. "Diana." 3. "Woman by the Sea," property of the Munich Pinakothek.	1212
1193	Franz Roubaud * München * "Fight in a forest, an episode in the conquest of the Caucasus."	Hermann Seeger * Berlin * "On the border of the field."	1213
1194	Maximilian Schaefer * Berlin * "Sum- mer Joys."	Adolf Seel * Düsseldorf * "Courtyard in Venice."	1214
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1196	Joseph Scheurenberg * Berlin * 1. "Portrait of Director A. von Werner," property of the Academical Art High School,	Franz Skarbina * Berlin * 1. "Before the departure." 2. "The old meadow at Carlsbad."	1216
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	sheperd boy," property of the National Gallery, Berlin.	K. Spitzweg + * München * "Anchorite, reading," property of the National Gallery, Berlin.	1218
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1198	Ed. Schleich + * München * "Evening landscape," property of the National	Otto Strützel * München * "Spring."	1220
1199	Gallery, Berlin. The Control of the	Walter Thor * München * 1. "Own Portrait." 2. "Lady's Portrait." 3. "Peasants Kitchen in Leutasch." 4. "The Lady Artist."	1221
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1201	Josef Schmitzberger * München * "Autumn Gold."	mingoes on the Mediterranean."	
1202	Hugo Schnars-Alquist * Hamburg * "Atlantic billows."	Hugo Ungewitter * Düsseldorf * "Attack of Culrassiers," property of the artist.	1223
1203	Hermann Schnee * Berlin * "Old town in the Harz mountains."	Max Uth * Berlin * 1. "From a little German Town." 2. "Poplars, October evening."	1224

5	Jacoslav Franz Jullus Vešin * München * "In front of the Horse Market in Macedonia."	Ernst Zimmermann + * München * 1. "In the Fisher's Hut." 2. "Study of a head."	1245
6	Hugo Vogel * Berlin * 1. "Going Home." 2. "Mother and Child."	Group 10.	
7	Heinrich Vogeler * Worpswede * 1. "The Return Home." 2. "Melusine Fairy Tale."	Group 10.	
8 9	Paul Vorgang * Berlin * "A Stormy Day." R. Warthmüller + * Berlin * "Frederick the Great at the body of Schwerin," property of the Berlin National Gallery.	Max Bärenfänger * München * 1. "Bavarian Peasant Girl," wood-cut. 2. "John Chambers, body physician to Henry VIII. of England," etching.	1246
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2	Josef Wenglein * München * "Evening on a High Moor."	Ettore Cosomati * Frankfurt a. M. * "Autumn."	1248
3	A. von Werner * Berlin * "European Congress in Berlin," property of the town of Berlin. 2. "Emperor William in the Mausoleum at Charlottenburg," property	Gustav Ellers * Berlin * "Frederick the Great travelling," after the painting from A. von Menzel.	1249
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П	liam 1. on his Death-bed," property of the Provincial Museum at Hanover.	Wilhelm Feldmann * Berlin * 1. "Sum- mer evening." 2. "A lake in the Mark."	1253
	Fritz Westendorp * Düsseldorf * "Entry to a Beguinage courtyard."	Otto Gampert * München * 1. Triple frame, containing etchings of the	1254
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	Fritz Wichgraf * Berlin * 1. "President Krüger receives a Boer Deputation in the Executive Council."	original etching. 3. "River landscape," original etching. lsmael Gentz * Berlin * "Three por-	1255
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	Rud. Bernard Willmann * München * "Lobster and Turtle."	Bruno Héroux * Leipzig * 1. "Witch- craft." Herkomer process, printed on	1256
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	Ludwig Willroider * München * "The Altmühl Valley."	printed on Japanese paper. 3. "Ex- libris," Graf Leiningen-Westerburg, ori-	
	Friedrich Wirnhier * München * "Child- ren reading."	ginal etching, Remarque print. 4."Ex- libris," (1). Flueckiger, original etching, Remarque print. 5. "Exlibris," A.	
	Anna Marle Wirth * München * "Book- shop at Antwerp."	Liebsch, original wood cut, Remarque print. 6. "Exlibris," G. Troje, original	
	Fritz Wucherer * Frankfurt a. (D. * "Morning" (Appletrees).	wood cut, hand printed. 7. "Exlibris," Dr. R. Neumann, original etching, Re-	
	Karl Ziegler * Berlin * 1. "Own Portrait." 2. "Portrait of my Father." 3. "Portrait of Frau Maler Stutz."	marque print. (Dartin Hönemann * Berlin * "Girl Reading."	1257

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1262	Albert Krüger * Berlin * 1. "Portrait of a young Girl," after Piero della Francesca. 2. "Portrait of a Doge," after Giovanni Bellini.	cuts in one frame. (A wood-cut after a water colour painting of Friedr. Stahl, the other wood-cut after an Indian ink drawing of G. Clooss.)	, , , ,
1263	Ludwig Kühn * Berlin * 1. "St. Paul in the Chamber," etching after Rem- brandt. 2. "Old Lady," etching after	Hermann Struck * Berlin * 1. Frame with 7 original etchings. 2. "Old man with a white beard," original etching.	1279
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1264	Georg Lührig * Dresden * "Poor Lazarus" (16 sheets of lithographs).	Rudolf Thienhaus * Berlin * 1. "Girl in a Japanese Costume." 2. "Head	1281
1265	Hans Meyer * Berlin * 1. "Peace," copperplate engraving, after Friedrich Geselschap. Original in Zeughaus in Berlin. Remarque print. 2. "A Dance of Death." Three etchings of a large Cycle. Original etchings, Remarque print.	of a Girl." Hermann Vogel * Dresden * 1. The- morial tablet for the 100th birthday of Ludwig Richter. 2. Themorial tablet for the 100th birthday of Thoritz von Schwind. 3. "Nursery, in fairy-tale	1282
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1268	Ernst Max Pietschmann * Dresden * "At the Brook."	Group 11.	
1269	Johannes Plato * Berlin * 1. "Intermezzo" (King and Fool). 2. "Stag Hunt," after Rubens.	Sculpture. Georg Bäumler * Frankfurt a. M. *	1284
1270	Otto Protzen * Berlin * 1. "November Storm." 2. "Baltic Coast." 3. "At Wannsee."	"Aphrodite." Tax Baumbach * Berlin * "Sibylla," bronze figure.	1285
1271	Doris Raab * München * 1. "Madonna," after Holbein, copper engraving, Remarque print. 2. "Female portrait," after Rembrandt, etching on parchment. Remarque print.	Reinhold Begas * Berlin * 1. "Pan and Psyche," bronze group. 2. "Sar- cophagus," bronze mortuary monument. 3. "Mercury," bronze figure. 4. "Bis- marck," bust in marble. 5. "Moltke,"	1286
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1273	Otto Reim * Berlin * "Banquet of Plato," after Feuerbach.	Eduard Beyrer * München * "Caecilia," Marble bust on pedestal.	1287
1274	Theodor Sander * Berlin * "November Evening," original etching.	Reinhold Boeltzig * Berlin * "Fountain group," lifesize, in bronze.	1288

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1289	Peter Breuer * Berlin * 1. "Adam and Eve," group in marble. 2. "Suffer the	Emll Kiemlen * Stuttgart * "Repentance."	1309
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1291	Georg Busch * München * "The prodigal son," bronze.	Ferdinand Lepcke * Berlin * "Sur- prised," group in bronze.	1313
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1298	Johannes Götz * Berlin * 1. "Athlete," bronze. 2. "Balancing boy," bronze.	HermJoachim Pagels * Berlin * 1. "Pessimist." 2. "Snake." Carl Baseler + "Girl reading."	1321 1322
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1301	bronze statuette. Bernhard Heising + * Berlin * "The prodigal son," bronze. Property of the Dresden Municipality.	Johannes Schilling * Dresden * 1. "Danald," bronze figure for a fountain. 2. "The Trout," bronze figure for a fountain. 3. Free copy of figures grouped	1324
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1344	Max Hasak * Berlin * 1. "Reichsbank, Cöln," façade. 2. ditto—interior view.	Freiherr Heinrich von Schmidt * München * "Church of St. Maximilian,	1359
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	Group 11.	Prof. Wilh. Hahn, Sculptor * München * Bronzes. See grp. 37 p. 447.	1405
1388	Sculpture. Exhibits of the Hanau precious metal Industry * See p. 438 and 440.	Johannes Hartmann, Sculptor * Leipzig, Leibnizstr. 26/28 * Marble bust of Ro- bert Schumann. See grp. 37 p. 450.	1406
1389	Exhibits of the Verein der Künstlerin- nen und Kunstfreundinnen * Berlin * See p. 399, 401, 438, 440, 441, 456,	Joseph Hinterseher * München * "Wood idyl," groups for a fountain. See grp. 37 p. 447.	1407
1390	457, 461 and 467. Exhibits of the Vereinigten Werkstätten für Kunst im Handwerk, G. m. b. H. * Wünchen * See p. 401, 438, 440, 441,	Hugo Kaufmann * München * "Time," (decorated glock) and "Coquetry," bronzes. See grps. 11, 32 and 37 p. 436, 441 and 447.	1408
1391	448, 459 and 465. Contact Beyrer * München-Gern * Bronze bust "Madonna" with wooden pedestal. See grps. 11 and 37 p. 396	Karl Kiefer, Sculptor * München * Adalbertstr. 49 * Bronze. See grps. 11 and 37 p. 397 and 447. Emil Kiemlen, Sculptor * Stuttgart *	1409
1392	and 447. Hermann Binz, Sculptor * Karlsruhe i. B.	Artistic bronzes. See grps. 11 and 37 p. 397 and 455.	
1393	* Bronze statuette.* See grp. 37 p. 446. Rud.Bosselt * Düsseldorf * Sculpture in wood and marble. See grp. 37 p. 448.	Prof. Max Klinger * Leipzig-Plagwitz * Marble busts of Richard Wagner and Franz Liszt. See grp. 37 p. 450.	1411
1394	Adolf Bredow, Sculptor * Stuttgart * Bronzes, bead moulding, Girl reading, sege vase, "Hermänndle" (statuette),	Georg Kolbe, Sculptor * Leipzig, Harden- bergstr. 32 * Marble bust of Johann Sebastian Bach. See grp. 37 p. 450.	1412
1395	silver ring bowl. See grp. 37 p. 455. Sophie Burger-Hartmann, Sculptor *	August Lucas, Wood carver * Düsseldorf * Cawings. See grp. 37 p. 448.	141
1700	Basel * Bronzes. See grps. 11, 31 and 37 p. 435, 436 and 447.	Georg Mattes, Sculptor * München- Pasing * Bronze. See grp. 37.	1414
1396 1397	Gerda Carré * München, Schelling- str. 92 * 2 bronze figures "The Dance."	Rudolf Mayer, Professor at the Kunst- gewerbeschule * Karlsruhe * Placques	1415
1391	Fritz Christ, Sculptor * München * Bronzes. See grps. 11 and 37 p. 397, 435, 447, 448 and 453.	and medals, cast and stamped. See grp. 37 p. 446. B. Rudolph, lvory carver * Stuttgart *	1416
1398	Prof. Fridolin Dietsche * Karlsruhe * 2 wall fountains, bronze bas-relief (St. Cecilia), 1 bronze bust and statuette	Busts, figures, reliefs, vases and bowls in ivory. See grp. 37 p. 455.	151
	"Hans Jakob." See grps. 33 and 37 p. 442, 445 and 447.	Prof. W. von Ruemann (* München * Hermæ of Bismarck and Moltke. (German State Building) p. 360.	1417
1399	Nelly v. Eichler, Sculptor * München * Bronze: "Adam and Eve," Terracotta: "Dancing." See grp. 33 p. 442.	Robert Schirmer, studio for sculpture * Berlin, Schaperstr. 32 * Ornamental and figure decorations of the Pottery Room	1418
1400	Otto Feist * Karlsruhe i. B. * 2 sta- tuettes and 1 portrait bust cast in bronze. See grp. 37 p. 446.	and its façade. Models for ornamental sculpture. See grp. 37 p. 457. See advertisements p. 30.	
1401	Erhard Fischer, Sculptor in wood * München * 2 models of ships, 4 coats of arms of minstrel. Medal International Exposition Chicago, Medal German Na-	Carl Schleusing, painter and carver in metals * Schöneberg, near Berlin * Relief in copper "H. I. (17). Wilhelm II. Emperor of Germany and King of Prussia."	1419
	tional Art Industry Exposition, Mün- chen, 1 prize of the Bavarian Industrial Museum.	Walther Schmarje * Schmargendorf, near Berlin * Plastics. See grp. 37 p. 451.	1420
1402	Theodor von Gosen, Sculptor * München * Bronze statuettes. See grps. 11, 30, and 37 p. 435, 436 and 447.	Prof. Adolf Schmid * Pforzheim * (Metal work (Bronze, silver and copper), placques. See grps. 30 and 37 p. 439 and 446.	1421
1403	Dr. Greiner * Darmstadt * Sculptures. See grp. 37 p. 453.	Daniel Stocker, Sculptor * Stuttgart * Studio for figure sculpture in bronze and marble. "Cain," "Kirke," and	1422
1404	Prof. Ludwig Habich, Sculptor * Darm- stadt * Sculptures. See grp. 37 p. 453.	"Psyche," bronzes. See grp. 37 p. 456.	

	111.0		
1423	Paul Sturm * Leipzig * Placques and medals with portraits or historical or allegorical subjects in bronze and silver. See grp. 37 p. 450.	Original objects of art workman- ship.	
1424	Artur Volkmann, Sculptor * Leipzig * Marble relief, "Orpheus and the beasts." See grp. 37 p. 450.	Exhibit of the Amber Industry. See p. 440, 441, 444 and 460.	1442 1443
1425	Prof. Hermann Volz * Karlsruhe * Plastic. See grp. 37 p. 454.	Exhibit of Vereins der Künstlerinnen und Kunstfreundinnen * Berlin * See p. 399, 400, 438, 440, 441, 456, 457,	1110
1426	Albert Wiegel, Sculptor * Kassel * Crystal picture "Kaiser Friedrich borne to Valhalla"; relief in marble, "America."	461 and 467. Exhibit of Vereinigten Werkstätten für Kunst im Handwerk, G. m. b. H. * Wünchen * See p. 400, 438, 440, 441,	1 4 4 4
	Group 12. Architecture.	Charles Bastian * Strassburg i. E. * Small table with tiles let into the top.	1445
1427	Prof. Herm. Billing * Karlsruhe i. B. * Architectural drawings, pen and ink drawings, and water colours (artistic architecture).	See grp. 37 p. 454. Prof. Peter Behrens * Düsseldorf * Artistic outfit of the Catalogue of the German Imperial Exhibit at the World's Fair, St. Louis, 1904. See grps. 17 and	1446
1428	Peter Birkenholz * München * Interior views of villa von Hesslin at Neu-Wittelsbach.	37 p. 411, 445 and 448. Frau Lilli Behrens * Düsseldorf *	1447
1429	Prof. Martin Dülfer * München * Designs for dwelling and country houses.	Coloured paper for book-binding. See grps. 17 and 37 p. 448.	47.7.0
1430	Erdmann & Spindler * Berlin, Link- strasse 29 * Architectural drawings, villas and mansions.	Emmy von Egidy * München * Useful articles in pottery. See grps. 30 and 31 p. 438 and 440.	1448
1431	Oswin Hempel * Dresden * Architectural drawings.	Fritz von Heider, Artist * Magdeburg * Vases, bowls, &c., in vitreous stone, ware, tiles. See grp. 37 p. 451.	1449
1432	Prof. W. Kreis * Dresden * Architect- ural designs.	Hans von Heider * Magdeburg * Vi- treous stoneware and lustrous porce-	1450
1433	Friedrich Lahrs * Charlottenburg, Leibnizstr. 7 * Perspective drawing of the "Schleusengehöft" lock house at Klein-Machnow.	lain. See grps. 10 and 37 p. 399 and 451. Rudolf von Heider, Sculptor * Elberfeld * Artistic pottery: busts, models of animals, vases, and useful articles.	1451
1434	Bruno Möhring * Berlin * Potsdamer Str. 109 * Architectural drawings, plaster model.	See grp. 45 p. 464. Georg Hulbe, Kunstgewerbliche Werk-	1452
1435	Albin Wüller * Magdeburg * Designs for countryhouses, and fitting up of interiors	statt für Lederarbeiten * Hamburg, Lindenstr. 43/46 * Artistic leather-work for the trade. See grps. 34 and 43	
1436	Prof. Joseph (D. Olbrich * Darmstadt * Architectural drawings, by hand and	p. 444 and 462. Prof. C. Kornhas * Karlsruhe * Portrait	1453
1437	printed, perspectives, &c. Gebrüder Rank * München * Garden fountain and entrance hall of a villa. Sketch for a country school house.	busts: relief and pottery in delft and faience with lustrous glasing. Artist pottery in delft and porcelain. See grps. 37 and 45 p. 446 and 464.	
1438	Prof. Fritz Schumacher * Dresden * Architectural drawings.	Kunststickereischule des Badischen Frauenvereins * Karlsruhe i. B. * Hand-	1454
1439	Prof. Emanuel Seidl * München * Six views of the "Augustinerbräu" building, Munich.	-woven carpet. See grps. 37, 43 and 58 p. 446, 462 and 468.	
1440	Spalding & Grenander * Berlin, Prinz- Albrecht-Str. 7 * Coloured drawings of villa Kruse, at Hiddensee; perspective of exterior, and view of the entrance hall.	Dax Läuger, Artist and Architect, Professor at the Technischen Hochschule. Atelier für Innenausbau * Karlsruhe * "Professor Läuger's art-pottery." Vases, wall placques, mantelpieces,	1455
1441	Hermann Strübe, Artist * Karlsruhe * Sketches and designs for architecture and artistic industries	stoves, fountains, drinking basins for schools, reliefs for churches, &c. General manager C F Otto Müller Kaiser.	

	strasse 144, Karlsruhe i.B. See grps. 35 and 45 p. 446, 447, 448 and 465, and also in the model town. J.J. Scharvogel * München * Sharp-fire pottery. See grps. 14, 37 and 45 p. 436, 447, 448 and 465.	1464
1456	Robert Macco, Kunstgewerbliche Werk- stätten * Heidelberg * Tarsias, inlaid jewel boxes, and showcases. See J. Glatz, Villingen. See grp. 37 p. 447.	1465
1457	grp. 37 p. 446, 452 and 453. W. Magnussen * Bremen * Models, stoneware by Scharvogel, Munich, and delft by J. Uffrecht, Neuhaldensleben. Theo Schmuz-Baudiss, Artist and pottery maker * Charlottenburg * Undergraphics of the glazed work on porcelain. (Royal porcelain by J. Uffrecht, Neuhaldensleben.	1466
1458	See grp. 45 p. 465. Jul. Müller-Salem, Teacher at the Kunst- gewerbeschule * Pforzheim * Metal bookbinding. See grp. 37 p. 446.	1467
	work. See grps. 33 and 37 p. 443 Rudolf Schwarz, Sculptor * München * and 446. Letterweight. See grp. 37 p. 447.	1468
1459	Hermann (Dutz, Kunsttöpferei * Altona a. E., Grüne Str. 19 * Useful and ornamental mental pottery of glased and coloured sharp-fire stoneware. See grp. 45 p. 465. Hermann Seidler, Artistic pottery maker * Konstanz * Useful and ornamental vases, &c., tiles, inlays and reliefs for house and church decoration, after	1469
1460	Oesterreich, Court bookbinder * Dresden * Binding of the "golden Book" Städtische gewerbliche Fortbildungsof the Dresden Municipality, designed by Professor O. Gussmann, Dresden. * Art-pottery. See grp. 37 p. 456.	1470
1461	See grp. 37 p. 449. Prof. B. Pankok * Stuttgart * Cushion of woven silk. See grp. 37 p. 448 and 455. Ernst Vollbehr, Artist * St. Heinrich am Starnberger See (Bayern) * Three handwoven pieces "St. George," "The tree	1471
1462	Kurt Randhahn, Kunsttöpferei u. keram of knowledge," and "Sailing-ship,"	
	chem. Laboratorium *Bunzlau (Sil.) and after Northern style. Eisenberg (SA.) * Ornamental articles of pottery in glased stoneware and clay. * München * Studio for industrial art.	1472
1463	Reichsdruckerei * Berlin * Artistic book- binding, exhibition articles, see grps. 15, 17 and 24 p. 404, 410 and 427. (Liberal Arts building.) Binding cut in cowskin. Werkstätten der Kunstgewerbeschule * Magdeburg * Vases and wall fountain See p. 465.	1473
	Department C.	
	Ciberal Arts. Palace of Liberal Arts.	
	1. Joint exhibitions,	
	comprising several groups.	1
	a) Exhibition of the German book-industry.	
	Groups 15 to 18.	
	Management: Deutscher Buchgewerbeverein Leipzig, Deutsches Buchgewerbehaus. Artistic arrangement: Bruno Möhring, Architect, Berlin.	
	Group 15. Barcelona (Suc. de J. de Neufville, Barcelona). Manufactures—type for text,	
	Typography.—Various printing headings and ornament, vignettes and borders from original designs of best artists. Brass lines. Specialities: ca-	
1476	Bauersche Glesserei * Frankfurt a. (1). * pital types, &c., of original "Bauer" Founded 1851 * Branch type foundry in face. Export to all civilised countries.	

	LIBERAL ARTS		
1477	Theodor Beyer, Kunstanstalt * Dresden * Modern artistic placards (Room 40 of the Art Industry Palace).	ments designed by prominent artists (Heinz König, Otto Hupp, and others). Specimen books on show: 1. "Hand-	
1478	H. Berthold, Messinglinienfabrik und Schriftgiesserei, AG. * Berlin SW. 29 * Copies of original productions. Typo- meter on the Didot system. Branches in Stuttgart, St. Petersburg and Moscow.	probe," containing all the firm's productions systematically arranged; title faces in "Small Fonts," American style. 2. "Muestario," spanish export catalogue. 3. Separate specimens: "Rö-	
1479	Bibliographisches Institut (Dever) in Leipzig, Branches in Berlin and Vienna * Printing and publishing, type founding, stereotyping, electro-typing, chromo-lithography, map printing, and lithographic printing. Chief work published, Dever's large Encyclopædia, Dever's small Encyclopædia, Natural science, works geographies, histories of literature, Helmolt's history of the world,	mische antiqua" (sold to the De Vinne Press of New York, Merrymount Press of Boston, and the matrices ceded to the Inland Type Foundry); "Klassische antiqua" (matrices ceded to the Keystone Type Foundry) "Schwabacher," "Neudeutsche," and many other Gothic and Roman faces. 4. Memoir of the Universal Type-lining system, first introduced into Germany by this house.	11/00
	Woermann's history of art, Meyer's edition of classical authors, tourists	HerderscheVerlagsbuchhandlung * Freiburg im Breisgau * See grp. 17 p. 408.	1486
	guides, travellers guides, and glossa- ries, "Cägliche Rundschau." See grp. 17	Wilhelm Hoffmann, AktGes., Kunstan- stalt * Dresden * Modern artistic pla-	1487
1480	p. 407. Brühlsche UnivBuch-u. Steindruckerei, R. Lange * Giessen * Founded 1828 * Three awards in Germany, one in America. Speciality commercial and artistic printing, Catalogues.	cards by Unger, Fischer, Heilmann, Cissarz, Gussmann, and others, and eight reproductions in fac-similé from the work "Handzeichnungen neuerer Meister." "The hand drawings of modern asters" (Art Industry Palace,	
1481	Bund der chemigraphischen Anstalten Deutschlands * Berlin, Friedrichstr. 240 * Etchings and heliogravures in one or more colours. Exhibit in the German State Building. See p. 359, and grp. 16 p. 405.	Room 40]. Heinr. Hoffmeister, Schriftgiesserei * Leipzig * Pattern books and frames with type, vignettes and borders. Original productions a speciality. Awards Chi- cago 1893, (Nilan 1894, and Paris 1900.	1488
1482	Deutscher Buchgewerbeverein * Leipzig * Collective exhibit, "Buchkunst und Kunst im Leben des Kindes." See grp. 17 p. 407.	Hollerbaum & Schmidt, G.m. b. H., Berliner Kunstanstalt für Buntdruck und Diaphanien * Modern artistic placards (Art Industry Palace, Room 40).	1489
1483	* Stable, Kgl. Hofkunstanstalt * Stuttgart * Chromolithography and lithographic printing. Speciality: high- est class placards and series-maps, only made to order.	Rast & Chinger, G. m. b. H. * Stutt- gart * New York branch: Chas. Hell- muth, 46-48 East Houston St. Chicago branch: Chas. Hellmuth 357-359, St. Clark Street. All colours for the whole	1490
1484	O.Felsing * Berlin SW. * Copper printer to the Court. Monochrome engravings and etchings on plates of various material. Multi-chrome etchings German Patent 127,254. See grp. 16 p. 405.	pictorial trade. See advertisements p. 18. Waschinenfabrik Kempewerk * Nürnberg * A special factory since 1882 for stereotyping, photo-engraving, racing machines and iron material for printing.	1491
1485	Genzsch & Heyse, Schriftgiesserel * Hamburg * Established 1833, Gold medal Paris 1900, first prize for printing type. Branch foundry at Munich; ware-houses and agencies in Paris, Barcelona, Lima, Santiago de Chile, and São Paulo. Seventy automatic and other casting machines, mostly of own construction and design. Engraving print-	German Patent on the first combined stereotype apparatus, in 1883, on the Widder stereotype apparatus with outlet for lead vapour, 1888, and on Combi's fittings for locking forms in 1898. Also protection on an improvement in Calander stereotypy, on Chemigraphy and construction of mechanical presses	

German Patent 1903 on drying matrices made of rag paper, patent applied for in 1904 on valve gas apparatuses for melting furnaces and type setting ma-

struction and design. Engraving, printing, and electro-typing departments. Specimens exhibited of some well known

registered original type-faces and orna-

chines, stereotyping and the foundations of etching presses. Karl Kempe, the owner and founder of the works, is the inventor of the paper matrix plate— See Alex Waldow, Encyclopædia of the graphic arts-and the author of "Papier-Stereotypie" ten editions in 1904; was awarded the silver medal at Amsterdam in 1892 for services to the stereotypie and printing, and the gold medal of the North German Exhibition of Trade and Industry held at Lübeck in 1895, the gold medal of the first Russian Exhibition of Printing at St. Petersburg in 1895, and the diploma of the Russian Technical Association. The factory has branches in Berlin and Exhibits: stereotyping and furniture casting apparatuses, paper matrices, lead alloys and milling machines for lead, zinc, brass and copper plates, facette materials, and a "Kosmos" rapid printing press and lastly "Die Papier-Stereotypie," 450 octavo pages, tenth edition in 1904.

Julius Klinkhardt, Printer and publisher, lithographie, xylographic and zincographic works, type-founder and book-binder * Leipzig * Lithographic works for scientific purposes.

Köhler & Lippmann * Braunschweig * Zylographic works. Wood cuts for technical industries.

G. Kreysing * Leipzig * Printing in Oriental languages, (original types) Arabic, Sanscrit, Hebrew, Hindustani, Cargumic, Assyrian, Sabaean, Cuniform, Ethiopian, Amharic, Hittite, Coptic, Pehlewe, and Armenian.

Dr. Lövlnschn & Co. * Berlin-Friedrichsfelde * Black and coloured inks for all branches of printing. Prints in inks of own manufacture. Specialities: finest autotype colour inks, inks for three colour printing, guaranteed indeliable Export to all civilised countries.

The Chromographic printing and publishing for artistic and commercial work. Art papers. See grp. 16 p. 406.

A. Wolling & Comp., Comm.-Ges. * Hannover * Lithographic art publishers. Speciality: Painting and picture books, illustrated postcards, cards of congratulation, fancy papers, posters and labels.

E. Nister * Nürnberg * Fine art printer and publisher. Chromolithography, lithography, printing, etching, photograpure, copper plate printing, collotype, process blocks, line and half tone, chromotypogravure, wood engraving, letterpress printing, book-binding, and embossing. Speciality: Complete production of books of all kinds, juvenile books, calendars, congratulation cards, post cards, show cards and advertising novelties. Fine art decorations for burning into porcelain and earthenware. Established 1876. 750 workmen. Branch house in London. Representatives in America: for ceramic art decorations, Palm Fechteler & Co., 80 Fifth Avenue, New York-for all other productions, E. P. Dutton & Co., 31, West 23rd Street, New York. See grps. 16, 17 and 45 p. 406, 409 and 465. Emil Pinkau & Co., Aktiengesellschaft * Leipzia * Factory for lithography, photography and phototype works. Founded 1873. 19 machines for rapid printing, about 60 other machines, and 250 workmen. Awards at Chicago 1893, and Paris (silver medal) 1900. Exhibits: the making of photographic impressions directly on the stone with and without rests. All plates are lithographed. Postcards produced by phototypy. rests.

Poeschel & Trepte, Buchdruckerei und Verlag * Leipzig * Books and printed matter in plain and artistic styles. See grp. 17 p. 408.

Relchsdruckerel * Berlin * Book-printing, lithography and copper plate in one or more colours, phototypy, heliography and other photo-mechanical processes, manufacture of banknotes and postage stamps and artistic watermarks. Established in 1879 by the union of the former Prussian Printing office with the "Geheime Ober-Hofbuchdruckerei" of R. von Decker. 1,724 hands (see special catalogue). See grps. 14, 17 and 24 p. 402, 410 and 427.

Josef Reinhart, Xylographer of the Reichsdruckerei * Gross-Lichterfelde * Enormous wood cut.

Rudhard'sche Giesserel, Type foundry * Offenbach a. (I). * Type founding, chemigraphy, galvanoplastics, letterpress type and decorations in high class artistic and technical styles. First class artists continually employed. Exhibited: specimen books, pamphlets, and examples of types and ornaments, original drawings. See grp. 17 p. 408.

J. G. Schelter & Glesecke * Leipzig * Founded 1819. 1,000 workmen. Type foundry, brass and wood cut factory. Department for acrography. Wakers

of numbering machines and others.

1499

1500

1501

1502

1503

1504

404

1496

1492

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1498

LIBERAL ARTS 1505 Arno Scheunert * Leipzig * Artistic regular workmen and assistants, 150 dies, seals, slamps for goods labels persons. Fifteen prize medals. and show cards. Fancy labels. grps. 16 and 17 p. 406 and 411. 1506 Ansgar Schoppmeyer, Privatdozent * J. J. Weber * Leipzig * Printer and 1512 Schöneberg near Berlin * For exhibit publisher, letterpress printing, xylosee grp. 9 p. 399. graphy and galvanoplastics, illustrated papers, artistic wood-cuts, illustrated Kunstverlagsanstalt und Verlagsbuch-1507 catechisms, portfolios, guide books for travellers, Universal cookery book. handlung Gerhard Stalling * Oldenburg i. Gr. * Founded 1789. Offices See p. 388 and grp. 17 p. 408 and 411. in Oldenburg and Berlin. The exhibit contains fine artistic hand-press engravings of German national pictures, Group 16. offered by special desire of the German inhabitants of America at the much Photography. reduced price of \$ 2 each. See grp. 16 p. 406. Aktien-Gesellschaft Aristophot * Taucha-1513 Leipziq und Berlin * Art departments Kunstanstalt Trowitzsch & Sohn * 1508 for photo-mechanical printing, and all Frankfurt a. O. * Phototypy in colours. branches of graphic industry. Pictures reproduced to order. publishing office. Ernst Bruckmann * Heilbronn a. Neckar 1514 * Photographs in autotypy. 1509 Vereinigung der Kunstfreunde, Kunst-Bund der chemigraphischen Anstalten verlag * Berlin * Phototypy in colours. 1515 See grp. 16 p. 406. Deutschlands Berlin SW., Friedrichstr. 240 * Chromotype and black, also twofold autotype. See German State Friedr. Vieweg & Sohn * Braunschweig 1510 * Printers, publishers, &c. Scientific Building p. 309 and grp. 15 p. 453. works of all kinds, the exact sciences, Elektro-Photochemische Industrie Ber-1516 particularly chemistry, physics, malin, G. m. b. H. * Berlin * Photographs thematics, anthropology, ethnography, medicine, hygiene, &c., chemical technology, industrial, farming, mechanics, on sensitive woven textures, wood and leather. Copies on chloride and silver papers. machine construction, electro-technics, &c. See p. 394 and grps. 17 and 140 O. Felsing, Kupferdruckerei * Berlin 1517 p. 408, 411 and 498. * Etchings in several colours by special patent process. See grp. 15 1511 Ernst Wasmuth, Arernst Wasmuth p. 403. chitekturbuchhand-GEGRIATE TO BERLIN lung und Kunstan-C. P. Goerz, Akt.-Ges. optische Anstalt 1518 GmbH stalten G. m. b. H. * * Friedenau bei Berlin * Miethe's Berlin * Founded projection apparatus for coloured pho-1871, limited comtography. pany since 1903. Hochstein & Weinberg * Berlin * 1519 Artistic plates and Founded 1873. Every kind of cardtables of architecboard for printing, photography, bookture. sculpture. binding, fancy paper making, &c., painting, the art mother of pearl paper, embossed paper, costumery, trade. and ground printing paper for book ornament and archeology. Printers covers, &c. Awards Berlin 1879, Sydney and publishers of the collection of weavings at the Royal Art Industry Duseum, Berlin; official publication at the instance of the Government of 1879, Melbourne 1880, and 1888, Porto Alegre 1881, Amsterdam 1884, Chicago 1893. First prizes. Export to all countries. the Kingdom of Prussia. Publisher of Jupiter, elektrophotographische 1520 the following periodicals: "Architecture of the twentieth century." "Archisellschaft m. b. H. * Frankfurt a. (D., Rossmarkt 19 * Electric lighting appartectural world of Berlin." "Town buildatus for instantaneous photography, permitting exposure of $^{1}/_{30}$ of a second. German Imperial patent. 2 Ameriing." Own art departments for photography, lithography, stone printing and

Mayence 1903.

can patents. Awards Düsseldorf 1902,

phototypy with hand and mechanical

presses. Persons employed, artists,

1521	Meissner&Buch,Chromolithographische Kunstanstalt * Leipzig * Phototypy in one or more colours. See grp. 15	druck: "A sunbeam," "Girl with doves in the kitchen." Max Glauer * Oppeln OS., Krakauer	1578
	p. 404.	Strasse 34.	1534
1522	Prof. Dr. Miethe * Charlottenburg *	Albert Gottheil, Photographer * Danzig.	1535
	Complete Miethe apparatus for pro-	Emil Gottheil * Königsberg i. Pr., Münz-	1536
1523	jection of natural coloured photograms. E. Nister, Kunstanstalt für graphische	strasse 6.	1550
1525	Reproduktionen * Nürnberg * Art prints, photogravures and photolithographs. See grps. 15, 17 and 45 p. 404, 409 and 465.	Jakob Hartmann, Photogr. Atelier * Ludwigshafen a. Rh. * Portraits in rubber, autotype, and ozotypy. Awards Baden-Baden 1899 and Mainz 1903.	1537
1524	Gerhard Stalling, Verlagsbuchhandlung	Herrmann * Dortmund, Ostenthalweg 18.	1538
	* Oldenburg * Engravings. See grp. 15 p. 405.	Hans Hildenbrand, Court photographer * Stuttgart.	1539
1524a	Dr. Franz Stoedtner * Berlin * Dia-	Hilsdorf, Photographer * Bingen a. Rh.	1540
1525	positives. See p. 359. Vereinigung der Kunstfreunde, Kunst-	Atelier Hülsen * Berlin NW., Dorotheen- strasse 72.	1541
	verlag * Berlin * Coloured phototype. See grp. 15 p. 405.	Junior, Photographisches Atelier * Frankfurt a. M.	1542
1526	Verlagsanstalt F. Bruckmann, AG., Ver-	Wilh. Knapp * Halle a. S., Mühlweg 19.	1543
	lagsbuchhandlung * München * Auto-	Wilh. Kübeler * Darmstadt, Ludwig-	1544
1527	typy. See grp. 17 p. 408 and 411. Ernst Wasmuth, Architekturverlag,	strasse 16.	
1321	Architekturbuchhandlung und Kunst-	Gebr. Lützel * München, Augustenstr. 16.	1545
	anstalten G. m. b. H. * Berlin * For	Max Lusche * Hof i. B.	1546
	exhibits see grps. 15 and 17 p. 405 and 411.	Friedr. Müller, Court photographer * München, Amalienstrasse.	1547
		Mart. Müller, Photographer * Blasewitz	1548
	Special group of professional and	bei Dresden. Joh. Niclou, Photographer * Chemnitz.	1549
	amateur photographs.	A. Pieperhoff, Photographer * Halle a.S.	1550
	Management: Prof. Dr. Miethe * Berlin.	Jos. Raab, Photographer * Braun-	1551
	a) Professional photographs.	schweig.	1551
	Management: F. Matthies-Masuren * Halle a. S.	Arthur Ranft * Dresden, Augsburger Strasse 9.	1552
1528	Jul. Benade, Hofphotograph * Erfurt.	Erwin Raupp, Court photographer * Dresden, Prager Strasse.	1553
1529	C. J. von Dühren * Berlin W., Mauer- strasse 61.	C. Ruf * Freiburg i.B. * Portraits: "Ge- heimer Rat Hegar," "An old man,"	1554
1530	R. Dührkoop * Hamburg, Ferdinand-	"Frau Sch.," "Frau Forstrat W.," "A	
	strasse 43 * Workshop for modern realistic photographs in photogravure	landscape."	1555
	rubber and charcoal-print. Gold medals	Rumbler, Photographer * Wiesbaden.	1555
	and highest awards: Baden-Baden, Berlin, Boston, Brussels, Hamburg,	Selke, Photosculpt-Ges. m. b. H. * Berlin * Photoplastics from life. Amer-	1556
	Hanover, Mainz, Magdeburg, Stuttgart, and Turin. Italian Royal State silver	ican patent no. 667,251/706,459. Siemssen, Courtiphotographer * Augs-	1557
	medal. Silver State medal of the Grand	burg.	1550
1574	Duchy of Hesse.	Wilh. Weimer * Darmstadt, Dieburger Strasse.	1558
1531 1532	Erfurth * Dresden, Reissigerstr. 46. Fritz Ette, Atelier für Photographie *	Gustav Werner * Leipzig, Zeitzer	1559
	Eisleben, Bahnhofstr. 18 * Open air	Strasse 16/18.	1560
1533	pictures (autotypes). "Childrens dance," "Two friends," "Two sunspots." G. Ferner & Sohn, Kgl. Bayer. Hofphoto-	Bruno Wiehr * Dresden, Reissigerstr.46. Ed. Wolleschak * Naumburg a. S. * Autotype portrait. Awards Weimar	1560 1561
1000	graph * Kaiserslautern, Pfalz * Kohle-	1901 and Dresden 1903.	

		-
b) Amateur Photography. (Danager: Franz Goerke * Berlin W., (Daassenstr. 32. H. (D. Carstensen * Flensburg. (Dr. H. Engellen * Elt Calentity	mana". The only great German export newspapers. Published in 3 editions. 72 numbers annually. Proprietors: Deutsche Verlags-Anstalt (vorm. Ed. Hallberger) Berlin-Stuttgart. Founded	
Dr. H. Engelken * Alt-Scherbitz. Otto Erhardt * Coswig-Dresden.	1848. 1000 workmen.	4501
W. Gesche * Hamburg. Franz Goerke * Berlin. Aura Hertwig * Charlottenburg. Dr. A. Kirstein * Berlin. Lette-Verein * Berlin. Max Lorenz * Klotzsche-Dresden.	* Founded 1884 * Highest award at Chicago 1893 and Turin 1902. Organ of the association "Archiv für Buchgewerbe" and supplements to the same displayed on the wall; 10th Volume of the Sample Exchange. Publications of the Association. For aims and objects	1584
Peter Lüders * Hamburg. Dr. Mannheim * Berlin.	of the Association scelntroduction p.157.	
Max May * Hamburg.	See grp. 15 p. 403. Deutscher Buchgewerbeverein * Leipzig	1585
Max Möller * Aachen. R. Proessdorf * Leipzig. Direktor RIchter * Lipine. Gertrud Saupe * Berlin. Otto Scharf * Crefeld. Ernst Schatz * Breslau. Hedwig Schüssler * Berlin. Dr. G. Sieveking * Hamburg. E. Steidel * Berlin. S. Urff * Hanau. Ed. Weingärtner * Leipzig-Lindenau. Karl Winkel * Göttingen. M. Winkelmann * Berlin. Prof. Dr. O. Witt * Berlin.	* Collective exhibit "Buchkunst und Kunst im Leben des Kindes" in which the 49 under-mentioned German firms participate. The exhibit includes artistically got up publications, picture books, juvenile books, book covers, job work, sample sheets from artistically got-up books, artistic lithographs, wood-cuts, title-pages, &c., and illustrates clearly the artistic capabilities of the modern German book-trade. Compare also exhibits in grp. 15 p. 402. Participators in the collective exhibit "Buchkunst und Kunst im Leben des Kindes":	1303
Aug. (1). Vincenz Ziemens * Neustadt.	Bard, Marquardt & Co. G. m. b. H. * Berlin * Various well got-up books.	1586
Group 17. Dooks and publications.—Books	Braun & Schneider & München & Wood- cuts, wood-cuts for illustration, chil- dren's picture books.	1587
binding. Bibliographisches Institut (Meyer), Ver- lagsbuchhandlung * Leipzig * For ar- ticles exhibited see grp. 15 p. 403.	Breitkopf & Hartel * Leipzig * Artistically gut-up music, incidental printed matter, exclibris, original lithography, artistic mural decoration for school and home, title-pages.	1588
Breitkopf & Härtel * Leipzig * Book, art, and music publishers, Book-print-	Breslauer & Meyer * Berlin * Börries Frhr. von Münchhausen, ballads.	1589
ing, lithography, and copper-plate print- ing, typefounding, electrotype, stereo- typing, book-binding, lithography and music engraving * Original musical	C. Busch du Fallols Söhne* Krefeld * Job work, mercantile lithographs, title pages.	1590
works. The only complete editions of the musical classics, Works dealing with the history of music, Popular edition of the classical and modern	Georg D. W. Callwey * (Dünchen * Books and separate Sheets from the "Kunstwart" undertaking. The German musician. Books for juveniles.	1591
masters. Practical libraries for the home and the concert-room * Established 1719. Branches in Brussels,	S. Calvary & Co. * Berlin * Berthold Feiwel, Songs of the Ghetto, with illustrations by E. (1). Lilien.	1592
London, New York. 50 steam and 30 hand printing presses. 750 Employees. Deutsche Export-Revue, Office of *	J. G. Cotta'iche Buchhandlung Nach- folger G.m.b.H. * Stuttgart * Various books, book-covers.	1593
Berlin S. * Publishers of the "Deutsche Export-Revue", "The Export Review" and "Revista de la exportacion ale-	Eugen Diederichs * Leipzig * Artistically gut-up books, book-pages, and book-covers.	1594

1595	W.Drugulin,Buch-u.Kunstdruckerel * Leipzig * Marksteine der Weltliteratur and specimen pages of this work.	Meyer & Seltz * München * Title- -pages from designs by Otto Hupp in München.	1615
1596	Alphons Dürr * Leipzig * A number of	Heinrich Ochmann * Leipzig * Title- pages.	1616
	juvenile books, with pictures by Oscar Pletsch and Ludwig Richter.	Martin Oldenbourg, Verlag * Berlin * Döpler-Ranisch, Walhalla, The Gods	1617
1597	S. Fischer, Verlag * Berlin * Books and book-covers.	of the Teutons. Schumacher-Kessler, Life of Jesus.	
1598	Fischer & Franke * Düsseldorf * Artistically got-up books, artistic drawings on stone (Original litho- graphs) for school and home.	Poeschel Trepte * Leipzig * Incident- al printed matter, exlibris and title- pages. See grp. 15 p- 404.	1618
1599	Genzsch & Heyse, Schriftgiesserel * Hamburg * Incidental printed matter produced from materials made in the	Rudhardsche Giesserei * Offenbach a. (D. * Incidental printed matter produced with original material made in the foundry. See grp. 15 p. 404.	1619
1600	type foundry. See grp. 15 p. 403. Heinrich Halfmann * Krefeld * Incidental printed matter. Exlibris.	Schafstein & Co. * Köln a. Rh. * Artistically got-up juvenile and picture books.	1620
1601	Harmonie, Verlagsgesellschaft für Literatur und Kunst * Berlin * Various	B. Schotts Söhne * Mainz * Song- -book for children.	1621
1602	books. Heinrichshofens Verlag * Magdeburg * Artistic headings for music.	Schuster & Löffler * Berlin * Various well got-up books published by the firm.	1622
1603	(D. Heinstus Nachforger * Leipzig * The Sermon on the mount. Dieffen-	E. A. Seemann * Leipzig * Original etchings, original wood-cuts.	1623
	bach, From childrens life. With illus- tration by Ludwig Richter.	Julius Sittenfeld * Berlin * (Demorial and artistic Calenders.	1624
1604	Georg Hirth, Verlag der Jugend *	J.A.Stargardt * Berlin * Various books.	1625
	München * The art journal "Jugend" and title pages of this paper.	B. G. Teubner * Leipzig * Books, Artistic mural Dekoration (Drawings	1626
1605	G. A. Hohns Söhne * Krefeld * Rhei- nische Verlagsanstalt, well got-up books.	on stone by artists) for school and home. Velhagen & Klasing * Bielefeld und	1627
1606	Inselverlag * Leipzig * Artistically got-up books.	Leipzig * Reinicke Fox, Fairy Tales, Song and Story Book. Illustrated	
1607	Janke & Kästner * Leipzig * Wood- -cuts for technical purposes.	with wood-cuts. Verlagsanstalt F. Bruchmann, Akt	1628
1608	Alfred Janssen, Verlagsbuchhandlung * Hamburg * Various books published	Ges. * München * Various books, book-covers. See grp. 16 p. 406 and 411.	1000
1000	by himself.	Deutsche Verlagsanstalt * Stuttgart * Several juvenile books.	1629
1609 1610	Paul Kittel * Berlin * Juvenile books. J. B. Kleinsche Buchdruckerei (T). Buscher) * Crefeld * Samples of job	Allgemeine Verlagsgesellschaft m.b.H. * München * Various books.	1630
	work and books.	Friedr. Vieweg & Sohn * Braun-	1631
1611	Alexander Koch * Darmstadt * Various art newspapers. See advertisements p. 11.	schweig * Wood-cuts for anatomical, technical and scientific purposes. See grps. 15 and 140 p. 405, 411 and 498.	
1612	Albert Langen * (Dünchen * Books, Book-covers, the journal "Simplicissimus" and back numbers of "Sim-	R. Voigtländer * Leipzig * Books, artistic mural Decoration (Drawings on stone by artists) for school and home.	1632
1613	plicissimus." F. A. Lattmann * Goslar * Job work.	J. J. Weber * Leipzig * Books, wood- -cuts for illustrations. See grp. 15	1633
1010	Börries Freiherr von Münchhausen, Juda, with illustrations by E.M. Lilien.	p. 405, 411. Georg Wiegand * Leipzig * Juvenile	1634
1614	Ferdinand Carl Löwes Verlag * Stutt-	books.	
	gart * Juvenile books.		

1635	Wilhelm Diebener * Leipzig * Verlags- buchhandlung. 1 copy of the book: "Monogramme und Dekorationen für Uhren- u. Edelmetallgravierung" which	fare of the people.—The Imperial Journal of Work. Gebrüder Hug & Co. Gegr. 1807 * Leipzig, Zürich, Basel, Strassburg i. Els.,	164
1636	has been published in 3 languages. Freier Verlag, G. m. b. H. * Berlin * Books.	St. Gallen, Luzern, Konstanz, Winter- thur * Music publishers, general book- sellers, export.	
1637	F.C. Glaser * Berlin SW., Lindenstr. 80 * Patent- u. techn. Bur. Publisher of the periodical "Glasers Annal. f. Gew. u. Bauw." * 10 vols. of this periodical and 2 books (copyright).	Heinrich Keller * Frankfurt a. (D. * Book- seller. Works on architecture, applied art, the history of art, costumes and heraldry. Publisher and general book- seller.	164
1638	Julius Groos, Verlagsbuchhandlung * Heidelberg * Founded 1804. Text-books, for Germans and foreigners, for acquir- ing modern languages according to the Gaspey-Otto-Sauer method. 200 vols.	Gerhard Kühtmann, Verlagsbuchhandl. * Dresden * Established 1887. Publisher of books on architecture, art and applied art, technics and mathematics, trade and handicrafts.	1646
	Comprising the following 20 languages: Arabian, Armenian, Chinese, Danish, English, French, Italian, Japanese, modern Greek, Dutch, Persian, Polish, Portuguese, Roumanian, Swedish, Spanish, Suahili, Turkish, Hungarian. Depots in New York, London, Paris, Rome, St. Petersburg, Madrid, Constantinople, &c. Annual sale about 150,000 volumes to all parts of the world.	Langenscheidtsche Verlagsbuchhandl. lung und Buchdruckerel (Prof. G. Langenscheidt) * Berlin SW.11 * Hallesche Strasse 17. Established 1856. Representative in St. Louis: B. Herder, 17 South Broadway. 1. Aids to the study of modern languages: 1. Letters instructing according to the Coussaint-Langenscheidt method in all civilised languages. 2. Encyclopædic dictionaries: Sachs-Villatte (French), Muret-	1647
1639	G. Grote'sche Verlagsbuchhandlung * Berlin SW. * Works on the history of art, belles lettres, pedagogy, etchings, colored wood-cuts.	Sanders (English), large and small edition, and Langenscheidt's pocket dictionaries and encyclopædies for all modern languages. 3. Histories of literature. 4. Vocabularies. 5. School	
1640	"Harmonle," Verlagsgesellschaft * Berlin * Prof. Reimann's illustr. biography of musicians (Paris 1900 awarded) 15 vols. Gay music (Überbrettl, farces).	grammars and various other aids. 6. Journal of the German Shakespeare Society. Il. Library of German translations of Greek and Roman classics.	
1641	Herdersche Verlagshandlung * Freiburg im Breisgau * Founded 1801. Publish- ers, printers, book-binders. Branches at Strassburg, München, Vienna, and	110 vols. Fritz Lehmanns Verlag, Verlagsbuchhandlung * Stuttgart * Books and separate sheets.	1648
	St. Louis, Mo. Employing altogether about 500 persons. Large publishing business of books in German and foreign languages, especially bearing	Ernst Morgenstern * Berlin * Vol. 8 and 9 of the "Deutscher Buch- und Steindrucker," central organ of the German graphic trades.	1649
	on catholic theology, pedagogy, belles lettres, social and political science, history, natural science, art and archæology, encyclopædia. About 200 works	E. Nister, Kunstanstalt für graphische Reproduktionen * Nürnberg * For Ex- hibits see grps. 15 and 16 p. 404, 406 and 465.	1650
1642	annually. See grp. 15 p. 403. Bruno Hessling, G. m. b. H. Verlags-buchhandlung * Berlin * Publication of works treating of architecture and industrial art.	Hermann Paetel, Verlagsbuchhandlung * Berlin, Elssholzstr. 12 * Proprietor Kommerzienrat Dr. Hermann Paetel und Alfred Paetel. Publications of the All- gemeinen Vereins für deutsche Lite-	1651
1643	Carl Heymanns Verlag. Rechtswissen- schaftl. Verlagshandlung * Berlin W. 8 *	ratur. Periodicals: Asien and Himmel und Erde. Colonial guide, Export guide, and other works.	
	Publications of the Imperial Patent Office.—Works on subjects connected with the promotion of the social wel-	Friedrich Pustet * Regensburg * Ver- lagsbuchhandlung mit Buchdruckerei, Buchbinderei usw. The latest editions	1652

	DIDCRIL		- 13
	of liturgical books printed in red and black letters, richly illustrated in ap-	Breltkopf & Härtel * Leipzig. Max Brockhaus * Leipzig.	1668 1669
	propriate original bindings. Hymn Books. Prize medals at Chicago 1893 and at many Exhibitions. Branches in	Buchhandlung des Traktathauses * Bremen.	1670
	Rome, New York and Cincinnati, O.	Carisch & Jänichen * Mailand.	1671 1672
1653	Reichsdruckerei * Berlin * For Exhibits see grps. 14, 15 and 24 p. 402, 404 and 427.	J.G.Cotta'sche Buchhandlung * Stutt- gart. Wilhelm Dietrich * Leipzig.	1673
1654	Dietrich Reimer (Ernst Vohsen), Verlags.	Ernst Eulenburg * Leipzig.	1674
1001	buchhandlung * Berlin SW., Wilhelm-	B. Firnberg * Frankfurt a. (1).	1675
	strasse 29 * Publications: Books and	A. E. Fischer * Bremen.	1676
1655	maps. See grp. 18 p. 411 and 489. L. Schottlaender & Co. * Berlin, Kur-	Rob. Forberg * Leipzig.	1677
1000	strasse 43/44 * Exhibit: Export number	Phil. Fries * Zürich.	1678
	of the "Confectionair," the most widely	Ad. Fürstner * Berlin.	1679
	circulated German organ for all articles	Fritz Gleichauf # Regensburg.	1680
	suitable for Export. Sample number gratis.	W. Groscurth * Berlin.	1681
1656	Wilhelm Schultz, Chefredakteur * Berlin	Julius Hainauer * Breslau.	1682 1683
1000	* Books.	Harmonie * Berlin.	1684
1657	Otto Spamer * Leipzig * Verlagsbuch-	Heinrichshofens Wusikverlag * Mag- deburg.	1004
	handlung. Popular scientific works, Pub- lications for instruction and entertain-	H. Hinz * Altona.	1685
	ment, juvenile publications for all ages.	L. Hoffarth * Dresden.	1686
1658	B. G. Teubner * Leipzig * Verlagsbuch-	Friedr. Hofmeister * Leipzig.	1687
1000	handlung und Buchdruckerei. Establ.	Gebr. Hug & Co. * Leipzig.	1688
	1811. Publishes works on philology,	Otto Junne * Leipzig.	1689
	mathematics, natural science, technics, modernlanguages and pedagogy; school-	C. F. Kahnt Nachfolger * Leipzig.	1690
	books and drawings on stone by artists.	Fr. Kistner * Leipzig.	1691
	Full report and special catalogues sent	Edgar Kramer-Bangart * Kassel.	1692
1.050	gratis on application.	F. E. C. Leuckart * Leipzig.	1693
1659	Velhagen & Klasing in Bielefeld und Leipzig* Verlagshandlung. Established	Friedrich Luckhardt * Leipzig.	1694
	1835. Illustrated printed works, illus- trated reviews, school-books and maps.	Luckhardt's (Dusikverlag (R. Lebrecht) * Stuttgart.	1695 1696
	Awards: Düsseldorf 1880 silver medal,	(Dusikhaus zum Fra nz Liszt (R. Volk - mann) * Weimar.	1050
	Leipzig 1897 gold medal, Paris 1900 gold medal, Düsseldorf 1902 gold	Louis Oertel * Hannover.	1697
	medal. See grp. 18 p. 411.	C. F. Peters * Leipzig.	1698
1659a	Verein der deutschen Musikalienhändler	H. Preiser * Liegnitz.	1699
	* Leipzig * Music of all kinds in port-	D. Rahter * Leipzig.	1700
	folios and bound volumes as a collective exhibit under the designation:	Alb. Rathke * Magdeburg.	1701
	German Dusical Exhibition,	Gebrüder Reinecke * Leipzig.	1702
		Rozsavölgyi & Co. * Budapest.	1703
	in which the following Music Publishers participate:	Carl Rühle * Leipzig.	1704
1660	Johann André * Offenbach a. M.	Schlesinger'sche Buch- und Musik-	1705
1661	A. Auer * Stuttgart.	handlung * Berlin. C. F. Schmidt * Heilbronn a. N.	1706
1662	M. P. Belaieff * Leipzig.		1707
1663	A. J. Benjamin * Hamburg.	Max Schmitz * Leipzig.	1708
1664	R. Bertram * Leipzig.	Walther Schröder * Berlin.	1709
1665	A. Böhm & Sohn * Augsburg.	H. Schroeder Nachf. * Berlin.	1710
1666	Ed. Bote & G. Bock * Berlin.	Fritz Schuberth jr. * Leipzig.	1710
1667	Adolf Brauer * Dresden.	J. Schuberth & Co. * Leipzig.	1711
E (di d		

1712	Schuster & Löffler * Berlin.	F. Volckmar, Sortimentsbuchhandlung *	1726
1713	Schweers & Haake * Bremen.	Leipzig * Library in the Reading Room	
1714	Bartholf Senff * Leipzig.	of the German State Building. Seep. 360.	1707
1715	C. F. W. Slegel's Musikh. (R. Linne-	Ernst Wasmuth, Architekturverlag, Architekturbuchhandlung und Kunst-	1727
	mann) * Leipzig.	anstalten, G.m.b.H. * Berlin * For Ex-	
1716	n. Simrock, G. m. b. H. * Berlin.	hibits see grps. 15 and 16 p. 405	
1717	Süddeutscher Musikverlag * Strass-	and 406.	
	burg i. E.	J.J. Weber, Verlagsbuchhandlung, Buch-	1728
1718	W. Sulzbach * Berlin.	druckerei, Galvanoplastische Änstalt,	
1719	Chr. Fr. Vieweg * Berlin.	Stereotypie, Xylographische Anstalt *	
1720	Henry Uries * Cöln a. Rh.	Leipzig * For Exhibits see grp. 15	
1721	Julius Weiss * Berlin.	p. 405 and 408.	
1722	Jul. Heinr. Zimmermann * Leipzig.	Prof. Daton Bolivano - Dr. 11 6	1720
1723	Musik-Woche * Leipzig * Modern illus-	Prof. Peter Behrens * Düsseldorf *	1729
1	trated musical newspaper with nume-	Artistic get up of the Official Cata- logue of the German Empire for the	
	rous supplements. Cheap Collections	Great Exhibition at St. Louis 1904. See	
1724	of music for piano, violin and singing. Verlag des Deutschen Reichs-Adress-	grps. 14 and 37 p. 401, 445 and 448.	
1124	buchs, G.m. b. H. * Berlin SW. 19 *	3 ,	
	The German Imperial Directory for In-	Group 18.	
	dustry, Trade, and Commerce. 2 Vols.		
	30 Marks. Medal awarded Paris 1900.	Maps and apparatus for Geo-	
1725	Verlagsanstalt F. Bruckmann AG. in	graphy, Cosmography and Topo-	
1	München * Publishers of Publications	graphy.	
	relating to art and the history of art and establishment for reproductions	Justus Perthes, Geographische Anstalt *	1730
	monumental works on antique sculpture,	Gotha * Maps and Atlases.	1100
	Greek vase painting, the architecture of	Dietrich Reimer (Ernst Vohsen), Ver-	1731
	the Renaissance. Publications referring	lagsbuchhandlung * Berlin SW. 48,	
	to galleries. Illustrations for school	Wilhelmstr. 29 * Publishers; maps,	
4700	walls. See grp. 16 p. 406 and 408.	charts, globes. See grp. 17 p. 410.	4770
1726	Friedrich Vieweg & Sohn, Verlagsbuch- handlung und Buchdruckerei * Braun-	Velhagen & Klasing, Verlagsbuchhand-	1732
	schweig * Book, periodicals, Reviews.	lung und Geographische Anstalt * Biele- feld und Leipzig * For Exhibits see	
	Seegrps.15,16and 140 p.405,408 and 498.	grp. 17 p. 410.	
	ocegeps.10,10ana 140 p. 100,400 ana 450.	grp. 11 p. 110.	
		4414	
	b) Exhibit by German Municip	alities. Groups 25, 26 and 27.	
	See Education and Social	Economy n. 381 and 502.	
		occurrence in the contract of	
7	2. Single	Groups.	
	E. Olligic	Otoups.	
	Groups 16, 17 and 18.	Dietrich Reimer (Ernst Vohsen) * Berlin	1743
	• •	SW., Wilhelmstr. 29 * Works and Maps	1110
	a) German Colonial Exhibits.	of German East Africa.	
	Can Davian House v. 1199	C.G. Schillings * Gürzenich-Düren * In-	1749
	See Agriculture p. 488.	stantaneous photos of wild animals in their	
1745	Kolonialwirtschaftliches Komitee * Ber-	native element with Goerz apparatuses.	
	lin, Unter den Linden 40 * Colonial	b) Single Exhibitors.	
1740	maps and Publications.	,	
1746	A. Krüss, Opt. Institut * Hamburg,	J. Littauer, Kunstsalon * Wünchen *	1750
	Adolfsbrücke 7 * Photographs by Dr. Uhlig.	Reproductions.	
1747	Justus Perthes * Gotha * Map of the	Werkstätten der Kunstgewerbeschule *	1751
1171	Protectorate of German East Africa.	Magdeburg * Printed matter. See grps. 10 and 37 p. 399 and 451.	
	restricted of octinal east fitted.	io and or propo and Tol.	

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1752	A. Wohlfeldt, Buch- und Kunstdruckerei * Printing the Explanatory Report for the Magdeburg Room. See grp. 37 p. 451.	(D. Fechner, Institutsmechaniker d. Kgl. geodätischen Instituts * Potsdam * Geodetic instruments.	1764
	Group 19. Instruments of precision, physical	R. Fuess * Steglitz bei Berlin * Scction I, optical, physical and mineralogical instruments. Sect. II meteorological apparatuses. Sect. III Seibt-Fuess Hydrotechnical instruments.	176
1753	Apparatus, &c. German Education Exhibition Scientific Instruments Section (mechanics and optics) in the Educational Building. (See Education p. 363, 373.) Carl Bamberg, Werkstätten für Prä-	F. O. R. Goetze * Leipzig * Factory for glass instruments, founded 1876. Beckmann apparatuses. Precision thermometers. Spectral tubes of own construction (registered in Germany and patented in England) Prof. Dr. Dorn of Halle is of the opinion that these tubes give an extremely clear and many lined spectrum.	1766
	zisionsmechanik und Optik * Friedenau bei Berlin * Astronomical, geodetical, terrestrial magnetic, and nautical instruments. Glass ground on the premises.	Ephraim Greiner, Glasinstrumente-, Apparate- und Gerätefabrik * Stützer-bach (Thüringen) * Manufacture and export of hydrometers for every purpose, barometers, thermometers for scientific or technical use, graduated	176
1754 1755	Georg Bartels * Göttingen * Electrometers and seismometers. Max Bekel * Hamburg-Barmbeck, El-	measuring glasses, gauged and now- gauged, instruments and appliances of every sort for chemical and physical la-	
1756	sassstr. 39 * Balances. Hugo Bieling * Steglitz b. Berlin, Flora-	boratories, dispensaries factories, &c. Founded 1868, numerous patents. Qua- lity prizes and chief awards: Brussels	
1757	strasse 2 * Instruments of precision. J.&A. Bosch, Konstrukteure und Wechaniker * Strassburg i. E. * Established 1889. Manufacturer of Seismometers,	1888, Chicago 1893 and Erfurt 1894. Günther & Tegetmeyer * Braunschweig, Höfenstr.12 * Apparatuses for measure- ment of electricity in the air.	1768
1758	meteorological instruments, precision balances and weights. R. Brunnée (vorm. Voigt & Hochgesang) * Göttingen * Polarisation and chemical microscopes. Collections of thinly-ground stones and minerals important from a petrographic point of view.	Emil Gundelach * Gehlberg i. Thür. * Glass works with regenerative gas furnace. Workshop for glassblowing with special gasworks. Workshops for grinding and cutting, as also for smiths and carpenters with electric power. Founded 1852. Wakes all	1769
1759	Paul Bunge * Hamburg, Ottostr. 13 * Balances.	appliances and instruments of glass for scientific uses. A number of vacuum tubes at	
1760	Reinhold Burger *Berlin N. 4, Chausseestr. 26 * Manufacturer of scientific glass apparatus and instruments of precision.	Trade work in special camera obscura. Mark Further Röntgen tubes, Dewar vessels for liquid air and glass apparatuses for physical purposes.	
1761	Arth. Burkhardt, Ing. * Glashütte (S.) * 1st German Calculating machines for all kinds of calculations. Awarded 15 First Prizes. Established 1878.	B. Halle * Steglitz-Berlin * Optical productions for polarization. Method of manufacture of Nicol prisms and cutting machine (original invention).	1770
1762	Continental-Caoutchouc & Gutta-Percha Co. * Hannover * India-rubber balloons. See grp. 72 p. 473.	Founded 1873. Awards: Brussels, Chicago, Paris.	4==-
1763	Dreyer, Rosenkranz & Droop * Han- nover * Manufacturers of armatures for boilers and machines, indicators and water-meters for municipal Water- supply. See advertisements p. 10.	Hartmann & Braun, AG. * Frankfurt a. (1). * 150 officials, 250 workmen. Factory of electric measuring instruments and apparatuses for science and industry. Complete equipments for electric laboratories and testrooms.	1771

galvanometer, standard resistance 1899, Paris 1900, Düsseldorf 1902. coils, &c., bridges, precision resistance Export to all civilised countries. Special Manufactury of Prof. Junkers' appacoils, &c., standard inductors and cells, Bismuth coils, iron testers, photometers, ratuses for determining heating power of gases and liquids, for hot water ampère meters, pointing and registersupply and gas heating. Exhibits: Prof. ing, voltmeters, wattmeters, ohmmeters. Further thermometers and pyrometers Junkers' calorimeter for rapid certain and lasting determination of heating for use in Laboratories and at switchpower of gaseous and liquid fuel; Prof. Junkers' automatic calorimeter, showboards, apparatuses for measuring insulations and locating of defects, complete cable scales. Electrometers. Wateing the heating value automatically. Prof. Junkers' gauger for gasometers, rials for installations. Peschel's system. A. Hasemann * Berlin * Mechanische &c. See special catalogue of German exhibition of education. Werkstatt. Founded 1849. Instrument for measuring the position of scale tongues in the metrical system. Pre-Dax Kohl * Chemnitz in Sachsen * 1778 Physical and chemical instruments for cision scales. scientific researches and demonstrations. Röntgen appliances and appli-Hans Hauswaldt, Dr. phil. h. c. * Magde-burg-Neustadt * Representation of interference in polarised light on ances for physical and chemical laboratories and auditorium. Largest establishment of the kind on the con-2 double plates and 2 prints; the latter tinent. Exhibition of instruments for printed in 300 copies and placed gratis science and demonstration in departat the disposal of universities and ment "Scientific Instruments" of Gerscholars. man exhibition for Education. Fittings H. Heele * Berlin O., Grüner Weg 104 * of lecture hall of Education Exhibition Scientific precision instruments. supplied by special request of Govern-W. C. Heraeus * Hanau * Established ment Commission: skylight shutter, 1851. Representative: Charles Engelhard, New York, 41, Cortlandt Street. Panneau's experimenting table with 270 workmen. modern equipment. Platinum composition. Manufacture of 32 officials. Chicago 2 Prizes, Paris platinum, fine silver and aluminium 1900 gold medal. apparatus. Aluminium welding pro-1779 Könlallches Aeronautisches Observatocess patented in most civilised countrlum bei Berlin * Exploration of upper ries. Own workshops for utensils. air regions. 5 kites, model of kite (Quartz-glass): Mountain crystal balloon system Parseval-Sigsfeld, Quartz-glass mercury lamp for prorubberballoons, cables and steelwires. ducing ultra violet rays, patented. Manufacture of electric laboratory Registering apparatuses for kites and rubberballoons, accessory apparatuses, stoves. About 500 supplied during model of cable winder. Publications. 2 years. Holborn & Wiens pyrometer 12 tables of curves, temperature above for temperatures up to 1600° C. Several Berlin in 1903. thousand in use. Manufacture of gold ieaf. silver leaf and lustre colours. A. Krüss, Optisches Institut * Hamburg 1780 * Proprietor Dr. Hugo Krüss. Founded Employ 5 chemists, 35 officials and 1796. Spectral apparatuses, Photo-100 workmen. Chicago 1893 Award: meters, Hefner lamps, Projection Paris 1900, Grand Prix. apparatuses. H. Hommel * Mainz * Fabrik Idarwerk 1781 E. Leltz, Optisch-mechanische Werk-Oberstein. Precision tools for measurstätte in Wetzlar (Deutschland). * ing standard controllers and for use Branches: Berlin, Luisenstr. 45; New York, 411 West 59th Str.; Chicago, in workshops as a means of exact adjustment and uniform measure-32-38 Clark Str. ments. Awards: Board of workmen, Saarbrücken 1903, gold medal. In-1782 Leppin & Masche, Fabrik wissenschaftl. dustrial and Trade Exposition, Düssel-Instrumente * Berlin SO. * Speciality: dorf 1902, silver medal. Paris 1900, Physical apparatuses for demonstration, for universities high schools, &c.

1777

1776

1772

1773

1774

1775

gold medal.

Junkers & Co. * Dessau, Filialfabrik Rheydt * Patented in all civilised countries. Awards: Chicago 1893, Leipzig 1897, München 1899, Berlin

grps. 23 and 64 p. 422 and 471.

See German exhibition of education.

Friedrich Lux * Ludwigshafen * Speed

indicators. See p. 365 and 373 and

1784	A. Densing * Berlin * Apparatuses for physical exploration of the sea. Deep sea watermark (practically tried apparatus for registring course of tides during 30 days).	S. Riefler, Engineer in Munich, Adolf Riefler, Kommerzienrat in Nesselwang. Theodor Riefler, Manufacturer in Nesselwang.	1705
1785	Prof. Dr. Wiethe * Charlottenburg * Projection apparatus for three colours.	Th. Rosenberg * Berlin N. * Factory of geodetical instruments, theodolites, nivelling instruments, compasses, tele-	1795
1786	J. D. Möller * Wedel i. H. * Founded 1864. Universum Diatomacearum Möl-	scopic graphometers and plane tables, &c. Paris 1900 gold medal.	1700
	lerianum with 4,026 Diat., 72 Diat. Type plates. Photographic micrometre and pigeon post messages. Glasssilvering with reflexion of 96 per cent. Optical works of precision.	Schäffer & Budenberg * Magdeburg- Buckau * Hydraulic pressure pumps with 4 manometers. See p. 373 and grps. 62 and 64 p. 470 and 471.	1796
1787	Richard Wüller-Uri * Braunschweig * Glass technical works of precision. Apparatuses for chemistry and physics. Founded 1894. Paris 1900 silver medal.	Franz Schmidt & Haensch, Optisch-me- chanische Werkstätten * Berlin S. 42 * Spectral apparatuses, polarisation and projection apparatuses, photometers, colorimeters and other scientific instru-	1797
1788	W. Niehls * Berlin N. * Royal Prussian medal. Gold medal Paris 1900. Mercury therm. +583°C. therm200°C. Tempering scale for glass. Glass taps. Testers for mineral oils. Metal therm.	ments, exhibited in the Departments: "Scientific instruments," "Chemical Industry," "Education," "Imperial Board of Health." G. Schoenner, Reisszeugfabrik * Nürn-	1798
1789	for instructional purposes. Kalserliche Normal-Eichungskommis-	berg * First factory in this line. Founded 1851. Highest prizes awarded. 400	
1169	sion * Charlottenburg * Precision scales for 25 kgs with weights, Photographs.	workmen. (Dany automatic special machines in use. Latest achievements are: Straightening device for compass handles. Patent lever for cleaning rul-	
1790	7. Peters * Berlin NW., Turmstr. 4 * Apparatuses for polarisation, spectro- scopes, calorimeters. Founded 1894. Last award: Paris 1900 Grand Prix.	ing pen, preserving the width of line exactly. Patented regulation by micrometer for adjusting the needle point of compasses. Improvement of joint-	
1791	Physikalisch-Technische Reichsanstalt * Charlottenburg * Scientific apparat- uses and photographs.	motion superior to the former pivot- joint. Louis Schopper * Leipzig, Arndtstr. 27	1799
1792	C. Richter * Berlin N., Johannisstr. 14/15 * Thermometers.	* Balances. Schott & Genossen * Jena * Glass-	1800
1793	A. Rledinger * Augsburg * Model of kiteballoon.	works, founded in 1884 by aid of the Roy. Pruss. Government * Scientific	1000
1794	Clemens Riefler * München * a) Mathematical precision instruments and instruments for technical drawing. Precision compasses, round system introduced by the firm. Precision drawing	and technical glasses, the latter as far as they are superior to those on the general market. Optical plate glass, large reflexion prisms, discs for telescope objectives; glasses transparent for ultra violet rays. Optical stained	
	pens with tongue opening sideways, fountain drawing pens, compasses for maps and distances, prolongable compasses, punctuating apparatuses of the newest, protected system. Ruling apparatuses, Ellipsographs, &c. b) As-	glass, tubes for thermometers, water- gauge, glasses for laboratories, chim- neys for incandescent light, petroleum and mining lamps. 600—700 work- men and officials. Award medal, Chi- cago 1893. Grand Prix, Paris 1900.	
	tronomical clocks with entirely free check, ditto with electric lift, regulating pendulum of nickel and steel, patented system Dr. S. Riefler. — 5 workshops, 100 workmen. Annual production about 160,000 instruments. 24 prize medals. Paris 1900 Grand Prix. Export to all countries. — Proprietor of firm: Dr.	G. A. Schultze * Berlin * Technical measuring instruments. Founded 1850. Awards at many exhibitions. Analyser for smoke gas, U.S.A. Patent, distance thermometers, air speed recorder for blast-engines, guaged thermo-areometers, standard thermometers.	1801

1 1			
1802	Dr. Siebert & Kühn * Kassel * Manufactury of glass precision instruments, speciality: Standard thermometer, from	Otto Wolff * Berlin W., Karlsbad 15 * Electric precision resistances. Carl Zelss, Optische Werkstätte * Jena	1811
	-200° to +575° C, vessels and thermometers up to 750° C of molten pebble-crystal.	* Established 1846. Employs at pre- sent about 1300 workers. Branches in Berlin, Hamburg, Frankfort-on-the-Main,	
1803	Slemens & Halske * Department: "Scien- tific instruments." Complete measuring	Vienna, London, St. Petersburg. Microscopes, micro-photographic outfit; pro-	
	outfits: for resistances of every kind,	jection-apparatuses (epidiascope); pho-	
	for current and voltage (with com- pensation apparatus), for determining	tographic objectives (planary, protary, unary, tessary); Palmos handappara	
	the quality of iron, for determining constants of inductions and energy	tuses; Verant; Zeiss-field-glass; rifle telescopes for aiming; monocular and	
	losses in alternating current instru- ments. Electrical measuring instru-	binocular mounted telescopes; land- scape telescopes; astronomical tele-	
	ments of every description for laboratory and switchboard use. Instruments for	scopes; Stereotelemeters; Stereocom- parators; Stereoscopes; optical mea-	
	pyrometrical measurements. Compass. See p. 374, 376 and 379 and grps. 26,	suring instruments. See grps. 3, 19 and 140 p. 364, 369, 371, 373, 374, 376,	
1804	74 and 141 p. 428, 473 and 500. Sommer & Runge * Berlin * Workshops	378, 380, 425, 498 and 500.	
	for fine mechanics. Exhibits: Dividing machine, at the same time comparator	In the German Hygiene Ex- hibition.	
	with 1 m spindle thread, two nuts, easily changeable, and two microscopes. Di-	See Social Economy p. 494 and 500.	
1805	rect reading of 0.001 mm. Wilh. Spoerhase vorm. C. Staudinger &	Prof. Dr. G. von Hüfner * Tübingen.	1813
1803	Co. * Giessen * Manufacturers of fine balances.	Fritz Köhler, Unlversitätsmechaniker * Leipzig.	1814
1806	P. Stückrath * Friedenau b. Berlin, Albestr. 11 * Balances.	A. Krüss, Optisches Institut * Hamburg.	1815
1807	Ludwig Tesdorpf * Stuttgart * Manu-	E. Leitz * Berlin. Otto Pressler, Fabrik wissenschaft-	1816 1817
	factury of all instruments for astro- nomy and geodesy; passage instru-	licher Apparate * Leipzig. E. Sartorius, Fabrik wissenschaft-	1818
	ments, universals, theodolites, levelling instruments, tachymeters, crocidolites,	licher Präzlsionsinstrumente * Göt-	1010
	military distance measures, precision indicators; awards: Chicago 1893, Lü-	tingen und Rauschenwasser. D. Schanze, Feinmechaniker * Leip-	1819
1808	beck 1895, Paris 1900, &c. Otto Toepfer & Sohn * Potsdam *	zig. Franz Schmidt & Haensch, Optisch-	1820
	Workshop for scientific instruments, founded 1873. Grand Prix Paris 1900.	mechanische Werkstätten * Berlin. W. & H. Seibert, Optisches Institut	1821
	Astrophysical and terrestrial magnetic instruments, registering arrangements,	* Wetzlar und Berlin. Carl Zeiss, Optische Werkstätte * Jena	1822
1900	microscopes, measuring instruments.		1022
1809	J. Wanschaff Sohn * Berlin * Work- shop for scientific instruments of astro-		
	nomy, geodesy, physics and navigation. Founded 1876. Chief production: In-	Aktlengesellschaft Schaeffer & Walcker * Berlin SW. 68, Lindenstrasse 18/19 *	1823
	struments with microscopic reading, necessitating most exact sectioning of	Kinematographic apparatuses and outfit therefore. Exhibit in "German-Tyrolese	
	circle. Large first class spectrometer with 8 inch circle and direct microscopic	Alps." See p. 506. Schumann & Cie., Rechenmaschinenfa	1824
	reading of 1 sec.; equiped completely for all measurements. Universal instru-	brlk "Saxonla" * Glashütte i.S. * Arith- mometer, system Thomas. Improved cal-	
	ment with circles of 14.5 cm $(5\frac{1}{2}$ inch.) diameter and direct microscopic reading	culators for all systems of reckoning, in- dispensable for every undertaking, is	
1810	of 10 sec. See advertisements p. 26. Prof. Dr. Wax Wolf * Heidelberg *	known as the simplest, most reliable and durable machine. (In Liberal Arts	
	Scientific photographs.	Building.)	

of own design, patented in several

Group 20. countries and recommended by virtuosi of the first rank. Flat build bows. Medicine and Surgery. German Education Exhibition Matth. Hohner, Harmonikafabrik * Trossingen * High class accordions and mouth harmonicas. Ocarinas of Department: Medicine and Surgery. unbreakable pottery ware. 1857. 1,500 workmen. Founded See Educational Matters p. 374. German Hygiene Exhibition. Rud.Ibach Sohn, Hofplanofortefabrik * Factory for cottage planos at Schwelm, See Social Economy p. 494 and 500. for grand pianos at Barmen, and since 1825 J. D. Riedel, Fabriken chemisch-pharma-1904 also in Berlin. Branches at Berlin, zeutischer Präparate * Berlin * Case for freeing from poison, system Prof. Cologne, Düsseldorf, Bremen, Hamburg and London * Firm founded in 1794 Dr. Kobert. by the great-grand-1826 Zentralkomitee für das Rettungswesen father of the prein Preussen * Berlin * Graphic representation of conditions of life-saving proprietor. sent Specialities: decorated every and ambulance matters in the German cases every style, heat Empire. proof instruments for the tropics and Exhibition of the United Royal instruments for Prussian and Grand Ducal State ships. Pianos for Railway Management music schools and seminaries. Pianos for the stage and * Berlin * concert platform. Exhibit: symmetrical grand piano (German Patent) after plans by Prof. Billing of Carlsruhe, Mear Forsyth Avenue in the open air. Transportation, see p. 473. exhibited in the concert hall of the 1827 Medizinisches Warenhaus, Aktienges. Baden Section. (Palace of varied In-* Berlin D., Friedrichstr. 108. dustries.) See grp. 37 p. 446. 1828 E. Wulff & Hohmann, Berliner Kranken-1835 Gebrüder Jehmlich, Hoforgelbauer möbelfabrik * Berlin C., Gertraudten-Dresden * Organ machinery, pneustrasse 8/9. matic system. Blast worked by electro motor. (Palace of varied Industries.) See grp. 37. Group 21. Carl Mand, Hoflieserant * Coblenz * A blue polished tarsia grand piano Musical Instruments. designed by Prof. Olbrich. (Palace of 1829 varied Industries.) See grp. 37 p. 453. J. Blüthner * Leipzig * 1 Drawingroom grand piano, 2 Alignot system J. Mollenhauer & Söhne, Hofinstrumentenmacher * Fulda * Founded 1822. Awards at all exhibitions where exin dark mahogany case. German State Building, Hall, upper story. p. 360. hibited: Cassel 1823 and 1870, Paris 1867, Wittenberg 1869, Vienna 1873, 1830 Deutsche Automatengesellschaft Stollwerck & Co. * Coln a. Rh. * Automatons Berlin 1898. (Danufacturers of all of every kind. (German-Tyrolese Alps.) wooden wind instruments. Speciality: See p. 506. Flutes, system Böhm, and piccolos. 1832 August Diehl, Geigen- und Bogenmacher 1839 F. Ad. Richter & Cie. * Rudolstadt * * Hamburg, Fuhlentwiete 23 * Founded Turning musical instruments: Libel-1876. Silver medal at the Hamburg lions. (Palace of varied Industries.) See Exposition 1889. Exhibits: three viogrp. 36 and 38 p. 445 and 459. lins, constructed on artistic principles, 1840 built originally throughout, with oil €. Rittershausen * Berlin 59 * Special varnish; exact copy of well known works for construction of flutes. Spe-Stradivarius, one ditto Magini, and ciality: Flutes system Böhm. Founded one original model with decorative 1876. Sole agent Carl Fischer, New relief carving. Violin and cello bows York.

1833

1834

1836

1841	Schledmayer, Pianofortefabrik vorm.	Group 23.	
	J. & P. Schledmayer, K. und K. Hoffie- ferant * Stuttgart * Manufacturers of	Chemical and Pharmaceutical Arts.	
	grand and upright pianos, also of Har-	German Education Exhibition.	
	moniums. 14 Court purveyors diplomas,	Department: Chemical Exhibition	
	40 medals and diplomas. Paris 1900	in Palace of Industry.	
	Grand Prix. Grand piano in oak de-	See Education p. 363 and 364 to 373.	
107/3	signed by Prof. Pankok. Volgtländische Musikinstrumenten-Fa-	Prof. Dr. Abegg * Breslau, Chem. Labora-	1849
1842	brik Hermann Dölling jun. * Markneu-	torium der Universität * Electrochemical	1043
	kirchen i. S. * String instruments. [Pa-	apparatuses, tables. See grp. 71 p. 367.	
	lace of varied Industries.)	Prof. Dr. Ahrens * Breslau, Matthias-	1850
1843	M. Welte & Söhne * Freiburg, Baden *	platz 8 * Literary works, periodicals.	
	Pneumatic Organs, Orchestras and Or-	Aktien-Gesellschaft der Chemischen Pro-	1851
	chestrions. Purveyors to princes and	dukten-Fabrik Pommerensdorfin Stettin.	
	the gentry. Highest awards at all exhibitions. Founded 1832. Exhibits:	Established by the Royal decree of 8.April 1857 * Factories in Pommerensdorf near	
	3 orchestrions in Lib. Arts Building, case	Stettin and in Wolgast * Present num-	
	designed by Prof. Hoffacker. 2 American	ber of workmen 850. Products of whole-	
	organs in Baden and Leipsic Music	sale Chemical Trade; yearly output about	
	room; cases designed by Prof. Billing and	80,000 tons. Aktien-Gesellschaft für Anilin-Fabri-	1053
	Drechsler, Architect. (Palace of varied Industries.) See grp.37 p.446 and 450.	kation * Berlin SO. 36 * Factories in	1852
	madeties.) See gep. or p. 140 and 400.	Germany: Berlin, Rummelsburg near	
	Cyarm 22	Berlin, Greppin; in France: Saint Fons	
	Group 22.	(Rhône); in Russia: Moscow, Libau.	
	Theatrical appliances and	Agents and warehouses in all centres of industry. Branch establishments in	
	equipment.	America: Berlin Aniline Works, New	
1844	Aktien-Gesellschaft Schaeffer & Walcker	York, Boston, Philadelphia, Chicago,	
- 9	* Berlin SW. 68, Lindenstr. 18/19 *	Charlotte. Articles manufactured: Arti-	
	Search light apparatuses for theatrical	ficial organic dyestuffs, aniline dyes	
1	effects.Fittings.(German-TyroleseAlps.) See p. 506.	also the raw and intermediate products for manufacture of the same. Perfumes.	
1845	Max Eberhardt, Ingenieur * München,	Various pharmaceutical preparations.	
1010	Goethestr. 74 * Fire extinguisher "Eber-	Photographic developers, Dryplates,	
	hardt" (in German State Building and	Flat and rolled Films. The firm employs	
	in the German departments of the Ex-	in its factories and branch establishments: 69 chemists, 15 engineers, 38	
	hibition palaces.) See p. 359 and	colorists, photographic officials, &c.,	
1846	grp. 64 p. 470. Laboratorium für chemische Feyer-	259 clerks, 1,978 male and 235 female	
1040	schutz-und Löschmittel Conrad Gautsch.	operatives.	
	G. m. b. H. * München. Branch office	Aktien-Gesellschaft für chemische Pro-	1853
	Berlin. Berlin W., Luitpoldstr. 38 *	ducte, vorm. H. Scheidemandel * Lands- hut (Bayern) * The head factory was	
	Experts for chemical fire extinguishers.	founded in 1873 and was converted on	
	Fire extinguishing substance: Gautsch' Standard fire extinguishing powder.	1. October 1895, on which occasion two	
	Fire proof impregnation of stuffs and	rival works were bought up, into a	
	fabrics. Fire extinguishing apparatuses	joint-stock-company. At the present time the company owns 9 factories,	
	[in German State Building and German	two of which are in Landshut and one	
	Departments of the Exposition palaces).	in each of the following towns Hass-	
1847	See p. 359 and grp. 64 p. 471. L. Leichner, Kgl. Kommerzienrat * Berlin	furt, Königsberg in Bohemia, Lehrberg,	
1071	SW., Schützenstr. * Purveyor to the	Allendorf, Lüneburg, Heiligensee and	
	Royal Theatres, face powder, rouge.	Ohlau. The articles manufactured in- clude gelatine, finest and cheaper size.	
	See grp. 23 p. 426.	mixed- and bone-glues as well as glue	
1848	Dinimax-Apparate-Bau-Ges. m.b. H *	powder, bone oil and bone meal.—Large	
	Berlin, Charlottenstr. 66 * Fire exting-	export business to three seaports by	
	uishing apparatuses in German State Building. See p. 359.	means of convenient waterways.—Largest Concern in this branch in Germany.	
	Landing. Oce p. 000.	good Concern in this orange in Cermany.	

1854	AktGesellschaft für Teer- und Erdöl- Industrie * Berlin W., Flottwellstr. 7 * Products of coal-tar-distillation, &c.	Prof. Dr. Blochmann * Königsberg, Chem. Labor. d. Univers. * Inorganic preparations. Literary works.	1867
1855	Paul Altmann * Berlin NW., Luisen- strasse 47 * Combustion-furnace with fittings.	C. F. Boehringer & Söhne * Mannheim- Waldhof * Factory for chemical pro- ducts. Branch-warehouse in New York.	1868
1856	W. Apel * Göttingen * Electrochemical apparatuses after Nernst.	Founded in 1859. 450 workmen, 33 chemists and engineers. Manufactures	
1857	Amme, Glesecke & Konegen * Braun- schweig * Laboratory-mill.	alkaloids, glucosides, extracts, syn- thetic medicaments, synthetic perfumes, glycerine, ether, gallic acid, resorcine,	1
1858	Prof. Dr. Anschütz * Bonn-Poppelsdorf, Meckenheimer Str. 158 * Preparations, plans, distillation in vacuum, combustion-furnace with fittings.	hydroquinone, &c. Numerous patents, especially in the branches of the synthesis of caffeine and the electrolytic reduction of nitrobenzene.	
1859	Badische Anilin- und Sodafabrik * Lud- wigshafen a. Rhein * Joint-stock-com- pany with a capital of 21 million marks. Year of foundation of the Ludwigshafen	Prof. Dr. Borchers, Geh. RegRat * Aachen, Techn. Hochschule * Electrical furnaces. See grp. 68 p. 364 and 367.	1869
	factory: 1865. Number of workmen: 7,750, number of officials: 880. Branches in Neuville-sur-Saône and in Butirki near Moscow. Manufactures:	Prof. Dr. Bredig * Heidelberg, Rö- merstr. 35 * Electrochemical apparat- uses. Literary works. See grp. 68 p. 364 and 367.	1870
	Artificial dye-stuffs, namely aniline-, resorcine-, naphthaline-, azo- (and substantive cotton-) and sulphur-dyes;	Prof. Dr. Bredt * Aachen, Techn. Hoch- schule * Model of the constitution of camphor. Preparations.	1871
	aniline-oil, aniline salt, alizarin dyes, gallic acid dyes; raw and auxiliary materials for the manufacture of the above. Indigo pure BASF (synthetic	Prof. Dr. Brunck * Freiberg i. S., Kgl. Sächs. Bergakademie * Apparatuses for gas-analysis. Inorganic preparations.	1872
	indigo), indigo preparations. Chrome and other mordants for dyeing and	Prof. Dr. von Buchka, Geh. RegRat * Berlin W., Keithstr. 21 * Literary works.	1873
	printing. Strong sulphuric acids, oleum and sulphuric anhydride; chlorosulphonic acid, sulphurous acid and sulphites, durable hydrosulphites; liquid	Prof. Dr. Buchner * Berlin NW., Wils- nacker Str. 3 * Hydraulic press. Pre- parations illustrating the chemistry of fermentation.	1874
1860	chlorine and chlorine derivatives; acetic anhydride; phthalic acid, benzoic acid, benzoic aldehyde. Georg Bartels, Mechaniker * Göttingen	Prof. Dr. Bülow * Tübingen, Oster- berg 21 * Preparations of the benzo- pyranol group.	1875
1861	* Apparatuses after Jolezalek. Johann Ambrosius Barth, Verlagsbuch-	Prof. Dr. Bunte, Geh. Hofrat * Karls- ruhe i. B., Nowacksanlage 13 * Gas- burette.	1876
1862	handlung * Leipzig * Literary works. Prof. Dr. Beckmann, Geh. Hofrat * Leipzig, Bruderstr. 34 * Apparatuses for de-	Prof. Dr. Busch * Erlangen, Löwenich- strasse 19 * Organic preparations.	1877
	termining molecular weights, prepara- tions of the menthol and camphorseries. Spectroscope for educational purposes.	Leopold Cassella & Co. * Frankfurt a. (1). * The firm was founded in 1828, the factory at (Dainkur in 1870. Branch	1878
1863	Prof. Dr. Behrend * Hannover, Herren- häuser Kirchweg 20 * Original pre- parations of the synthesis of uric acid.	factories: Manufacture Lyonnaise de matières colorantes, Lyon. Russische Anilinfarben-Fabrik Leopold Cassella	
1864	Prof. Dr. Biehringer * Braunschweig, Techn. Hochschule * Preparations.	& Co., Riga. American house: Cassella Color-Company, New York, 182 and 184,	
1865	Prof.Dr.Blitz * Kiel, Holtenauer Str.148 * Preparation resp. auto-oxydation. Apparatuses for determining vapour density.	Front Street. Artificial dyestuffs; in particular: Acid-azo-dyestuffs for wool, diamine dyestuffs, "Immediate" dyestuffs, and the stuffs.	
1866	Dr. Biltz, Privatdozent * Göttingen * Apparatuses for determining vapour density.	stuffs, anthracene acid dyestuffs, anthracene chrome dyestuffs, diaminogen dyestuffs, eosine dyestuffs, rosaniline dyestuffs.	
		,	

1879	Kölner Ceresinfabrik Gebrüder Maus, G. m. b. H. * Cöln a. Rh. * Ozokerite, Ceresine, bleached Carnauba Wax. Speciality: Ozokerite Cable wax for insulating and impregnating all kinds of cables. Warehouses in Hamburg, London, Paris, Trieste, Genoa and Barce-	percent, Strontium Hydrate, Barium Chloride, Sulphuric acid, free from arsenic and iron, especially for accumulators, Sodium Sulphate, Hydrochloric acid, free from arsenic, Nitric acid, compressed Carbonic acid. See p. 367. See advertisements p. 15.	
	lona. Representatives and agents in all foreign and transmarine places. Estd. 1898. Awards: Düsseldorf 1902.	Chemische Fabrik, Dr. Eugen Schaal * Feuerbach * Varnish preparations.	1886 1887
1880	Alwin Nieske, Chemische Fabrik Altherzberg * Dresden-N. 8 * Chromium-, Tungsten- and Molybdenum metals and salts. Tungsten Copper and Tin Mining works in Spain. Tin-, Baryta- and Zinc-white. Aluminium palmitate. Chromium salts. Molyform. Ammoniac. Ammonium carbonate. Estd. 1877. 130 workmen. Gold and State Medals of Merit.	Chemische Fabriken vorm. Weiler-ter Weer * Ürdingen a. Rh. * Estd. 1861. Factories in Ürdingen a. Rh., Cöln a. Rh., Müngersdorf, Crefeld and Riehl. 900 officials and workmen. Engines of 1,300 H. P. 26 Boilers with 2,650 gm heating surface. Specialities: Aniline dyes and intermediate products. Sulphur dyes: Auronal-Black, -Brown, -Green, -Olive, -Orange, -Yellow. Sub-	1001
1881	Chemische Fabrik von Hugo Blank & Berlin & Products of Wood distillation: Methylalcohol, Formic aldehyde, liquid and solid (Trioxymethylene), Acetic acid, Acetic anhydride, Acetone.	stantive Dyes: Black, Brown, Green, Blue, Orange, Chrysophenine, Congo Red, Benzopurpurine. Basic Dyes: Bismarck Brown, Chrysoidine, Malachite Green, Brilliant Green, Methylene Blue,	
1882	Chemische Fabrik Durlach, Dr. Neuberg * Durlach, Baden * Cartaric acid and Sul-	Methyl Violet, Crystal Violet, Fuchsine, Auramine. Acid Dyes: Wool Black,	
	phites. Speciality: Chemically pure Cream of Tartar for Baking powder. Surpasses all other products in the world as regards purity and quality. Manufactured by special process. Total output in 1903: over 2,000,000 kgs, of which 1,500,000 kgs were exported to all parts of the world.	Acid Brown, Night Green, Induline, Wool Blue, Water Blue, Acid Violet, Fast Red, Azorubine, Ponceau, Scarlet, Orange, Azoflavine, Azo Yellow, Methanil Yellow, Naphthol Yellow, Nigrosine and Induline, soluble in water and spirit. Dyes soluble in Spirit and in Fats.	
1883	Chemische Fabrik Gernsheim-Heubruch * Mannheim * Salts of metals, Nitro-, Amido- and Chlorine derivatives, Aro- matic Hydrocarbons.	Paranitraniline, Aniline oil, Aniline salt, Alphanaphthylamine, Dimethylaniline, Monoethylaniline, Diethylaniline, Diphenylamine, Benzidine, Colidine, Naph-	
1884	Chemische Fabrik Griesheim-Elektron, Aktiengesellschaft * Frankfurt a. M. * Estd. 1856. Works in Griesheim a M., Mainthal, Spandau, Küppersteg, Bitter-	thylamine sulphonic acids. Stannous Chloride. Pink salt, &c. Numerous Patents. Export to all countries. 1. Chem. Institut der Universität Berlin*	1888
	feld, Rheinfelden i. B. 160 Officials, 2,500 workmen. Products: Mineral	Busts and preparations of Liebig's, Wöhler's and A. W. von Hofmann's.	
	acids, Alkalies, Sodium, Magnesium, Calcium carbide, Ferrosilicium, Chro- mates, Permanganates, Nitrite, Sulphur,	Chem. Institut der Universität Bonn * Preparations and Models of Aug. Kć- kulė's.	1889
	Phosphorus, Hydrogen (compressed), Chlorine (liquid), Bleaching powder, Chlorides of Sulphur and Phosphorus, Bisulphide and Tetrachloride of Carbon,	Geh. Regierungsrat Prof. Dr. Classen * Aachen, Techn. Hochschule * Apparatuses and Models for quantitative analysis. Eletrolysis.	1890
	organic Nitro- and Chloro-nitro-com- pounds, Aniline derivatives.	Prof. Dr. Cohen * Göttingen * Electro- lytic Carbon precipitates.	1891
1885	Chemische Fabrik Hönningen, vormals Walther Feld & Co., Aktiengesellschaft	Prof. Dr. Conrad * Aschaffenburg, Forst- akademie * Preparations from the de-	1892
	* Hönningen a. Rh. * Manufacturers of Barium- and Strontium-preparations. Specialities: Barium Carbonate 96 to	partment of Malonic acid Syntheses. Prof. Dr. Dennstedt* Hamburg, Jungius- strasse* Combustion Apparatus, Pyrrol	1893
	99 percent, Barium Hydrate 96 to 98 percent, Barium Oxide, Crude Sulphide of Barium 70 to 80 percent, Permanent white, Strontium Carbonate 92 to 95	preparations. Deutsche chemische Gesellschaft * Berlin, Sigismundstr. 4 * Plans of the Hofmann House, literary Works.	1894

1895	Carl Diederichs, Inh. Spindler & Hoyer * Göttingen * Apparatuses after Nernst.	(Bavaria), Moscow (Russia), Creil (France). The staff consists of 810
1896	Dr. Dimroth * Tübingen, Hölderlin-	officials (225 chemists, 335 clerks, 55
1030	strasse 22 * Mercury compounds of	engineers, 200 foremen) and about
	Phenols.	5,500 workmen. 1. Coal Tar Dyes
1007		[Aniline-, Resor-
1897	Prof. Dr. Doebner * Hallea. S., Albrecht-	cine-, Naphthaline-,
1000	strasse 3 * Organic preparations.	Azo-, Alizarine-
1898	Prof. Dr. Drude * Giessen, Phys. Inst.d.	-dyes, Dyestuffs for
	Universität * Electrochemical apparat-	developing in the
	uses. See grp. 71 p. 368.	Sibra Indiana in
1899	R. Eisenmann * Berlin, Wühlenstr. 6-7	Trademark all 3,000 Dyestuff
i i	* Absolute Alcohol, Sulphuric Ether,	standard), Intermediate products and
	Collodium of all kinds, Stiffening liquid	Mordants. 2. Technical-Chemical pro-
	for Incandescent mantles, Amylacetate,	ducts (Acids, Caustic soda, &c.). 3. Phar-
	Amyl-, Butyl- and Propylalcohol.	maceutical Products: e. g. Antipyrine,
1900	Prof. Dr. Elbs * Giessen, Hofmannstr. 5	Pyramidone, Migranine, Anæsthesine,
	* Electrochemical apparatuses, Prepar-	Albargine, Diphtheria-Remedy, Tetanus-
	ations obtained by means of electrolylis.	Antitoxine, Curative serums for combat-
	See grp. 68 p. 364 and 368.	ing infectious diseases of animals
1901	Prof. Dr. Emmerling * Berlin W.,	(Anthrax serum, &c.), Koch's Tuber-
	Meineckestr. 9 * Organic and physio-	culine. 4. Chemicals for photographic
	logical preparations.	purposes (Developers, Fixing salt,
1902	Prof. Dr. Engler, Geh. Hofrat * Karls-	Dyestuffs for Three colour photography
	ruhe i. B., Kaiserstr. 12 * Models of	and Lightfilters). About 1,200 Patents
	atoms, First Synthesis of Indigo, arti-	in Germany and abroad, about 700
	ficial Petroleum, Apparatuses.	Trademarks. Numerous Highest awards.
1903	Prof. Dr. Erdmann * Charlottenburg,	Prof. Dr. E. Fischer, Geh. RegRat * Ber-
	Leibnizstr. 80 * Apparatuses.	lin, Hessischestr. 3 * Organic Dyestuffs,
1904	Farbenfabriken vorm. Friedr. Bayer &	Phenylhydrazine, Uric acid group, Sugar
1301	Co. Akt. Ges. * Elberfeld, Leverkusen	group, Decomposition of albumen, Syn-
	a. Rh., Barmen, Schelploh (Germany),	theses of Polypeptides, Apparatuses.
	Moscow (Russia), Flers (France) * Esta-	Literary works.
j	blished 1850. Employs 1,260	Prof. Dr. F. Fischer * Göttingen, Hohe
	Officials including 165 Scien-	Strasse 1 * Apparatuses for Gasanaly-
	tific Chemists, 34 Engineers	sis. Calorimeters.
	with University Diplomas,	Prof. Dr. O. Fischer * Erlangen * Chem.
	72 (Dechanics and 5500	Instit. d. Univers. Organic Dyestuffs.
	Workmen. Manufacture: Sulphuric acid	Prof. Dr. Freund * Frankfurt a. (D.,
	and Anhydride, Nitric acid Hydro-	Stiftsstrasse 32 * Alkaloids.
	chloric acid, Alkalies, all intermediate	Prof. Dr. Fromm * Freiburg i. B., Bis-
	products of the Coal-Tar Branch, all	marckstr. 6 * Organic preparation.
	Alizarine-dyes (alizarine-Cyanines, -Sa-	
8	phirol), Aniline-and Azo-dyes (Diamond	Prof. Dr. Gabriel * Berlin, Reichstags-
	Black, Sulfonecyanine, Direct deep-	ufer * Organic preparations.
	-black), Katigen Dyes (Katigen-black,	August Gerber * Cöln a. Rh. * Busts.
1	Katigenindigo). Pharmaceutrical Pro-	Germanisches Museum * Nürnberg *
	ducts: Agurine, Aristol, Aspirine,	Alchemistic apparatuses.
	Citarine, Helmitol, Heroine, Isopral,	J. Glesel & Co. * Dresden-Plauen * Manu-
	Mesotane, Protargol, Salophene, Tan-	facturers of non-poisonous colours for
	nigene, Thezoine, Triona, Somatose, Creosotal, Duotal, Piperazine, Phena-	food and relishes, soap and fat indu-
	Creosotal, Duotal, Piperazine, Phena-	stry; Fruit aroma essences for sweet-
	zetin, Sulphonal, Salicylic-acid, Salol,	meat manufacture. Ethereal oils and
	Aristochine, Veronal. Photographic	essences. Export to all civilised coun-
	Products: Edinol, Bayer's-Flashlight,	tries. Awards: Gold and Silver Medals.
	Bayer's Adherive Paste, photographic	See p. 371. See advertisements p. 13.
	papers.	Dr. Heinrich Göckel * Berlin W. 9 * Physi-
1905	Farbwerke vorm. Meister Lucius &	kalisch-chemisches Institut, Speciality:
	Brüning AG. * Höchst a. (1). * Estab-	Manufacture and testing of Standard
	lished 1862 * Capital 17 Million Marks.	glass-instruments, Reagents and So-
	Branch establishments: Gersthofen	lutions.

Th. Goldschmidt, Chemische Fabrik und Prof. Dr. Hempel, Geh. Hofrat* Dresden, 1922 1916 Zinnhütte * Essen-Ruhr * Established Technische Hochschule * Apparatuses 1847. 400 Workmen. Value of yearly for fractional distillation and for Gas output 8,000,000 (I). Diand Smoke-gas Analysis. ploma: Berlin 1879. Me-W. C. Heraeus * Hanau * Vessels of 1923 dals: Chicago 1893, Gold medals: Paris 1900, Düs-Quartzglas, electric furnaces. Platinum apparatuses for Chemical laboraties. seldorf 1902; Prussian State Medals. U.S.A. The See Grp. 19 p. 413. 1924 Gebr. Hevl & Co., G. m.b. H. * Charlotten-Goldschmidt Thermit Comburg * Manufacturers of Chemical copany, New York, Wall Street, Exchange lours. Established 1833. Colours for the Building 43-7, room 1508 Exchange Place. Metals free from carbon, Chro-Glazed paper-, Wall paper- and Paper industries, for Printing and Lithomium, Manganese, Ferrotitanium, Mography. All mineral-, wood varnishlybdenum, Ferrovanadium, &c., Thermite and aniline varnish-colours. Paris- and for carrying out the Goldschmidt alu-Steel blue, Manganous borate, Permaminothermic method of welding and nent White for Chromo- and photohard-soldering. Tramway lines Tubes, Steel and Iron Castings welded with graphic papers. Prof. Dr. Holde * Berlin, Geisbergstr. 40 1925 Thermite, Korubin and polishing discs. * Analytical apparatuses for the ana-Titan Thermit and anti-piping thermit for obtaining iron and steel castings lysis of Fats and Petroleum. Organic free from blowholes and of a finer grain. preparations. Dr. H. Grossmann * Münster i. W., Uni-F. Hugershoff * Leipzig * Ampèremeter 1926 after Bredig & Hahn. versität * Inorganic Double salts. Haarmann & Reimer, Chemische Fabrik Ichthyolgesellschaft Cordes Hermanni & 1918 1927 zu Holzminden, G.m.b.H. * Holzminden Co. * Hamburg * Ichthyol preparations. (Braunschweig) * Established 1874. Ma-See p. 372. See advertisements p. 24. nufacture of synthetic Perfumes. The Prof. Dr. Jacobson * Berlin, Genthiner 1928 following bodies were either discovered Str. 14 * Models, preparations and or first manufactured by our firm: Valiterary works. nilline (1874), Heliotropine and Cuma-Kalle & Co. * Biebrich a. Rh. * Establi-1929 rine (1878), Terpineol (1889), Isoeugenol shed 1863. Branch Houses: U.S.A.: Kalle (1890), Linalool and Linaly lacetate (1891), & Co., New York, Boston, Philadelphia, Jonone (1893), Irone (1893), Pineapple qeqründet 1882. Russia : ChemicalWorks aroma (1901), Oil of Cassia flowers, artificial (1903). Our products obtained Kalle & Co., Warsaw, established 1884; Chemical Works Kalle & Co., Warsaw, Silver and Gold Medals at the following Exhibitions: Philadelphia 1876, Frank-Warehouse in Lodz, established 1903. Austria: Miller, Kalle & Co., Hruschau furt a.M.1877, Amsterdam 1877, Sidney 1903. Agencies in all centres of in-1879, Hamburg 1880, Melbourne 1880/81, dustry. Artificial dyestuffs: Aniline-, Frankfurt a. (D. 1881, Antwerp 1885, Berlin 1888; Chicago 1893. In Paris 1900 Azo., Naphtaline and Sulphur dyestuffs for wool, silk, cotton, leather, paper, the firm obtained the Grand Prix of Group &c. &c.; Raw- and intermediate pro-Ill. Export to all parts of the world. In ducts for Coal Tar Dyestuff manuthe United States of America the profacture; Pharmaceutical preparations. ducts of the firm are manufactured by 106 Clerks, 88 technical Officials (Chethe Haarmann-de Laire-Schaefer Co. in mists and Engineers) and 600 Work-Maywood, New Jersey. The manufacture of most of the products is secured to the men. Export to all European and American States, also to Japan, China, firm by patents in all civilised countries. India, Australia and Africa. Owners Prof. Dr. Harries * Charlottenburg, Berof numerous Patent brands and Tradeliner Str. 36 * Distillation in vacus. marks in all civilised countries. The Ozone apparatus. Literary works. Orfirm obtained Awards at the Interganic preparations. national Exhibitions in Paris 1867, Hartmann & Braun, Mechaniker * Vienna 1873, Barcelona 1888, Chicago Frankfurt a. M. 1893, Paris 1900, also at the Exhibitions in Nishnij Novgorod 1896, Düsseldorf Heidelberger Gelatinefabriken Stoess & 1921 Co. * Heidelberg * Gelatine for various 1901, Osaka 1903; the firm also obtained purposes. the Royal Prussian State Medal in 1901.

1917

1919

	Siborri	2 mes	
1930	Erwin Kerker, Mechaniker * Breslau * Apparatuses after Abegg.	1900. Translated from the third German edition and considerably enlarged by L.M.	
1931	Knapp, Verlagsbuchhandlung * Halle a.S. * Collection of electrochemical works.	Dennis, Professor of Analytical and in- organic chemistry in Cornell University.	
1932	Dr. O. Knöfler & Co. * Plötzensee b. Berlin * Manufactory of chemical preparations for Incandescent Gaslighting: Thorium and Cerium nitrate, &c. Established 1889.	1902). The firm was established in 1870; the present owner constructed and supplies instruments for testing iron bridges such as apparatuses for the graphic measurement of tension, flexion, horizontal	
1933	Knoll & Co. * Ludwigshafen a. Rh. * Establ. 1886. Chemico-pharmaceutical preparations, especially alkaloids and new medicaments.	vibrations and deformation. Indicator diagram apparatuses, self registering measurers for tension and the strength of materials, Graphic apparatus for	
1934	Prof. Dr. Knorr, Geh. Hofrat * Jena, Chem. Instit. d. Universit. * Organic Pre- parations. Pyrazoles, Morpholine, De- composition of Morphine. Tautomerism.	showing the velocity of water Apparatus for drawing the cross- and longitudinal sections of water courses, &c. (own Patents). See advertisements p. 30.	
1935 1936	Fritz Köhler, Mechaniker * Leipzig * Apparatuses after Oswald. Prof. Dr. König, Geh. RegRat * Münster	Prof. Dr. Liebermann, Geh. RegRat & Berlin, Matthäikirchstr. 29 * Organic Preparations, Synthesis of Alizarine.	1946
	i. W., Agrikchem. Versuchsanstalt * Apparatuses, Cellulose preparations, literary works.	Prof. Dr. Lindner * Charlottenburg, Stuttgarter Platz 1 * Apparatuses, Models, Preparations resp. Chemistry	1947
1937	Prof. Dr. Kühling * Charlottenburg, Bis- marckstr. 21 * Literary works.	of Fermentation. Prof. Dr. von Lippmann * Halle a.S.,	1948
1938	Prof. Dr. W. Küster * Tübingen, Kep- delerstr. 20 * Haematine preparations.	Raffineriestr. 28 * Literary works.	
1939	Dr. Kunckell * Rostock i. (D., Chemisches Institut der Universität * Organic pre-	G. Luther, AktGel. * Braunschweig * Laboratory mill.	1949
1940	parations.	Friedrich Lux * Ludwigshafen a. Rh. * Gas balance. See grps. 19, 23 and 64	1950
1940	Kunheim & Co. * Berlin, Dorotheen- strasse 32 * Preparations of Rare earths, Inorganic salts, Liquefied gases. Pro- ducts obtained by working of Gas puri-	p. 365, 373, 413 and 471. Dr. Mahla * Berlin, Keithstr. 8 * Organic preparations.	1951
1941	fying mixture, Alloys. Dr. Kutscher * Marburg, PhysChem.	Prof. Dr. Marckwald * Berlin, Kur- fürstendamm 240 * Organic prepa-	1952
1942	Institut * Yeast preparations. Prof. Dr. Ladenburg, Geh. RegRat *	rations, Radioactive substances. Dr. L. C. Marquart * Beuel-Bonn a. Rh. *	1953
1312	Breslau, Kaiser-Wilhelm-Str. 108 * In- organic and organic preparations, lite- rary works.	Factory for manufacture of chemical, pharmaceutical, technical and scientific preparations. Establ. 1846. Awards:	
1943	Prof. Dr. Lange * Krefeld, Dyeing and Finishing School * Demonstration resp. Application of Dyestuffs.	London 1851, Düsseldorf 1852, Munich 1854, Treves 1854, Paris 1855, London 1862, Paris 1867, Amsterdam 1869,	
1944	6. A. Lentz * Berlin D., Gr. Hamburger Str. 2 * Stirring and shaking apparatus for laboratories, driving shaft for work table, draught cupboard, vacuum pump, vacuum apparatus.	Vienna 1873, Philadelphia 1876, Düsseldorf 1880, Antwerp 1885, Antwerp 1894, Paris 1900, Düsseldorf 1902. Specialities: Acetocaustine, Camphoric acid, Cinnamic acid, Ferrocyanic acid, Fumaric acid, Malonic acid, Malic acid,	
1945	Oskar Leuners Wechanisches Institut * Dresden * Apparatus for technical Gasanalysis, Weasuring burettes with and without corrections for temperature and air-pressure. Absorption and combustion pipettes. Apparatuses for exact gasanalysis of Wercury, with all absorptions and measuring apparatuses after Geheimrat Professor Dr. Walther Hempel in Dresden (see "Gasanalytische Wethoden" by Dr. Walther Hempel, 3d Edition	Phosphomolybdenic acid, Sorbic acid, Titanic acid, Ammonium nitrate, Phosphomolybdate of ammonia, Bismuth subnitrate, Cadmium acetate, Caesium alum, Caesium bitartrate, Calcium bimalate, Calcium malate, Powdered oxide of copper, granular copperacide, Eudermol, Ferrostyptine, Hexamethylene tetramine, Jodoformine, Jodoformal, Potassium permanganate, Copper-potash alum, Lithio-Piperazine, Lithium bromide, Li-	

thium carbonate, Lithium chloride, Li-
thium citrate, Caustic Soda. Soda-lime,
Nicotine puriss., Nicotine sulphate, Ol. sorbi, Pepsine, Picrocarmine, Lead io-
sorbi. Pepsine, Picrocarmine, Lead io-
dide. Rubidium Alum, metallic Zinc.
dide, Rubidium Alum, metallic Zinc, Zirconium hydroxide, Molybdæn pre-
parations. Preparations for Bacteriology,
Chemical analysis, Electrotyping, Iron
Marka Caramia art Cabaratarias Mi
Works, Ceramic art, Laboratories, Microscopic work, Perfumery, Pharmacy,
croscopic work, Persumery, Pharmacy,
Photography, Pyrotechnic and Textile
industry.
Franz Mayerhoff & Co., Maschinenfabrik
* Berlin N. 28 * Geschäftsgründung 1875. Ice-machines of any capacity for Chemical Works and Laboratories. Gold
1875. Ice-machines of any capacity for
Chemical Works and Laboratories. Gold
and Silver Medals.
E. Merck. Chemische Fabrik und bakte.
E. Merck, Chemische Fabrik und bakte- rlologisches Laboratorium * Darm-
stadt; Branch establishments in Moscow
and London; Merck & Co., New York
and Ct favia + All Chamicals for The
and St. Louis * All Chemicals for The-
dicinal-pharmaceutical purposes, espe-
cially alkaloids and glycosides, also the
following specialities: Bromipine, Dio-
nine, Jodipine, Stytizine, Tannoform,
Tropacocaine, Veronal, 30 percentages
chemically pure Hydrogen Peroxide,
also strong Diphtheria Serum remedy,
Strentococcus serum. Pneumococcus
Streptococcus serum, Pneumococcus scrum, Anthrasc serum, Chyroid serum,
Jequiritol and Jequiritol serum, also
all Reagents for medical, pharmaceut-
ical and technical purposes; likewise
Chemicals and Preparations for micro-
chemicals and reparations for micro-
scopic, bacteriological and photographic
use, and preparations for incandescent
Gas-light, Preparations for the Textile
Industry, Pyrotechnics, Perlumery, Fer-
mentation and allied Industries. See
Industry, Pyrotechnics, Perfumery, Fermentation and allied Industries. See p. 367, 369, 371, 372 and 379 and
grp. 140 p. 499.
grp. 140 p. 499. Prof. Dr. von Meyer, Geh. Hofrat * Dres-
den, Lessingstr. 6 * Literary works.
See p. 365.
Prof.Dr. Meyer * Braunschweig, Moltke-
strasse 11 * Organic preparations. See
p. 366 and 370.
Prof. Dr. Meyerhoffer * Berlin, Uhland-
strasse162 * Models. See grp. 68 p. 366.
Due Du Wieler in But 1 1 3
Prof. Dr. Michaelis * Rostock i. M.,
Chem.Inst.d.Universität * Inorganic and
organic preparations. See p. 366 and 369.
Prof. Dr. Miethe * Charlottenburg,
Techn. Hochschule * Preparations for
Photography in Natural colours. See
p.364, 370 and 373 and grps.16 and 19
p. 406 and 414.
Robert Wittelbach, Mechaniker * Göt-
tingen * Apparatuses after Nernst.
See p. 368.

1954

1955

1956

1957

1958

1959

1960

1961

1962 Prof. Dr. Mltscherlich * Freiburg i. B., Chem. Inst. d.Univ. * Preparat. See p.372. Prof. Dr. Möhlau * Dresden, Semper-1963 strasse 4 * Colloidal Indigo. See p. 370. Prof. Dr. A. Naumann, Geh. Hofrat * 1964 Giessen * Apparatuses of Liebig's. See p. 365. Prof. Dr. Nernst * Göttingen, Bürger-1965 strasse 50 * Electrochemical apparatuses, Electrochemical laboratory table. See p. 365, 366 and 368. 1966 Prof. Dr. Noelting * Wühlhausen i. Els., Städt.Chemieschule * Organic Dyestuffs. See p. 370. 1967 K. Oehler * Offenbach a.M. * Anilin-and Anilinfarbenfabrik. Established 1850. 600 officials and workmen. Manufactures: a) Intermediate products: Aniline and Aniline salt, Toluidine, Nitrobenzene and Nitrotoluene, Tolidine, Benzidine, Paranitraniline, β -Naphthylamine, Diphenylamine, Methylaniline, Naphthol- and Naphthylaminesulphonic acids, &c. b) Dyestuffs: Fuchsine, Phosphine, Leather Yellow, all kinds of aniline blue, solid blue (Induline), Methylviolet, Benzoflavine, azo-dyes, especially Wethanil yellow, cloth red, Coluyleneorange and brown, Naphthazurine blue, Triazol-dyes,Congo and Benzopurpurine, Hydrazine yellow, &c. See p. 370 and 371. Prof. Dr. Ost * Hannover, Techn. Hoch-1968 schule * Models, Diagrams, Inorganic and Organic preparat. for technological instruction. See p. 366 to 369 and 372. Prof. Dr. Ostwald, Geh. Reg.-Rat * Leipzig, Phys.-chem. Inst. d. Univ. * Electro-1969 chem. apparatuses. See p. 365 and 368. 1970 Prof. Dr. Paal * Erlangen, Engelgasse 9 * Preparations of colloidal Metals, preparations of Chinazoline derivatives. See p. 366, 370 and 371. F. W. Pest * Berlin * Copper goods 1971 factory. Establ. 1830. Spec.: Brewery apparatuses. Copper apparatus forcultivat. of pure yeast after Prof. Dr. Paul Lindner. Prof. Dr. Pfeffer * Leipzig, Linnéstr. 1 * 1972 Apparatuses for the measurement of Osmotic Pressure. See grp. 71 p. 366. Prof. Dr. Pinner, Geh. Reg.-Rat * Berlin, Luisenstr. 56 * Organic preparations, 1973 Decomposition of Nicotine. 1974 Kgl. Preussische Porzellanmanufaktur * Berlin * Porcelain Vessels, &c., for chemical laboratories. See grp. 46 p. 464. Dr. Pschorr * Berlin W., Kurfürsten-1975 damm 25 * Apparatuses, preparations of the Phenanthrene- and Morphine Series. See p. 371.

1976 Dr. F. Raschig * Ludwigshafen a. Rh. * Largest factory in the world for crystal. lized and liquid Carb. acid, Orthocresol, Metacresol and Paracresol. See p. 370. Prof. Dr. Reinke * Braunschweig, Techn. 1977 Hochschule * Apparatuses and preparations illustrating the Chemistry of Fermentation. See p. 372 and 373. 1978 Prof. Dr. Reissert * Literary works. 1979 Prof. Dr. Rimbach & Bonn, Beckenheimer Str. 71 * Literary works. See p. 365. Dr. Rohde * München, Theresienstrasse 1980 * Cinchotoxine, Cinchonine, Quinine preparations. See p. 371. Dr. Rosenheim * Berlin, Alsenstrasse 1981 * Inorganic preparations. See p. 366. 1982 Jacques Rosenthal * München * Dealer in old books. Alchem. literature. See p. 365. Prof.Dr. Ruff*Berlin, Thomasiusstrasse 1983 * Apparatuses, Inorganic and Organic preparations. See p. 366-368 and 372. Gebrüder Ruhstrat * Göttingen * Elec-1984 trochemical laboratory table. Seep. 368. 1985 Dr. Sachs * Berlin. Hessische Strasse * Organic preparations. See p. 369. 1986 E. Sachsse & Co., Inhaber Dr. Otto Lampe und Albert Dufour Feronce * Leipzia * Factories in Leipzig-Reudnitz and Liesing near Vienna, in which the following materials are treated: Aromatic woods, Seeds, Plants, Spices, Drugs, Chemicals and Spirit. From these are manufactured: Ethereal oils, artificial Perfumes, Pharmaceutical preparations, Fruit-ethers and essences for liqueurs, beverages and sweetmeats. Of the above we specially mention: Ambrette seed oil, Anethol, oils of Bergamotte and of Lemons free from terpenes, Cognac oil, Iris oil, oil of carraway, Nutmegoil, artificial oil of Neroli, oil of Roses and Ylang ylang oil, Patchouli oil, Sandalwood oil, oil of Cinnamon, Benzyl acetate, Bornyl acetate, Carvol, Citral, Citronellol, Eucalyptol, Geraniol, Hyacinthine, Linalol, Linalyl acetate, Menthol, Neroline, Thymol, Cinnamylalcohol. The first to manufacture on a large scale the following: Hirudine (patented in various States), a new product obtained from leeches to prevent the coaquiation of the blood. Export trade to all parts of the world. Awards: London 1862, Stettin 1865, Paris 1867, Moscow 1872, Vienna 1873, Dresden 1895, Philadelphia 1876, Amsterdam 1877, Sydney 1879, Hamburg 1879, Melbourne 1881, Porto Alegre 1881, Amsterdam 1883, Leipzig 1897. The firm was established in 1895 by the grandfather of the two present proprietors Geh. Kammerrat Dr. Carl

Lampe, along with the chemist Mr. Emil Sachsse in connection with his wholesale drug business existing since 1750, Brückner, Lampe & Co., Leipzig, Berlin, Hamburg, to the partners of which the present owners of the firm E. Sachsse & Co. still belong. See p. 372.

Prof. Dr. Salkowski, Geh. Reg.-Rat * Münster i. W., Chem. Inst. d. Universität *Organic preparations. See p. 370 and 372.

Prof. Dr. Salkowski * Berlin, Physiolog. chem. Institut der Universität * Physio-

logical preparations.

F. Sartorlus * Göttingen (Prov. Hannover) * Mechanical Factory for precision instruments. Analytical Balance in mahogany case with counterbalanced front slide; at 200 grs. maximum charge, sensitiveness 1–10 grs. A set of gold plated weigths from 1 mg to 100 g. Hydrostatic Balances with steel knife-edges for liquids. All kinds of finer balances for physical, chemical and technical purposes. Established 1870. 100 workmen. Prizes awarded at all Exhibitions where represented. At the International Exposition in Brussels they received a Special Prize for the best type of analytical Balance. Yearly output about 750 balances. Export to all countries. See grps. 19, 20 and 140 p. 367, 368, 415, 426 and 498. Schmidt & Haensch, Franz \star Berlin S. 42, Prinzessinnenstr. 16 * Polarising apparatuses, Photometers, &c. Seep. 366, 373, 376 and grp. 19 p. 414 and 415. W. Schmldt, Mechaniker * Giessen *Ap-

paratus after Elbs and Drude. See p. 368. Prof. Dr. Scholl * Karlsruhe i. B., Bunsenstr. 15 * Fulminate of mercury

preparations. See p. 369.

Schott und Genossen * Jena * Glass vessels for chemical purposes. See grps. 19 and 140 p. 366, 374, 414, 426 and 498. Dr. Theodor Schuchardt * Görlitz (Schlesien) * Est. 1863. Awards at 27 Exhibitions. Chemicals for scientific, photographic, pharmaceutical and ceramic purposes. Speciality: Pure Reagents, Chemical preparations, chemicals for Incandescent Gas Light, Metallic oxides. See p. 367, 369 and 371.

Prof. Dr. Schultz * München, Giselastr. 3 * Organic dyestuffs. See p. 370.

Prof.Dr.Siegfried * Leipzig, Lindenstr.1 * Albumen preparations. Apparatuses. See p. 371 and 372.

Prof. Dr. Staedel, Geh. Reg.-Rat * Darmstadt, Herdweg 76 * Apparatuses for preparing crystalline Peroxide of Hydrogen. See p. 366.

1987

1988

1989

1990

1991 1992

1993

1994 10

20

1995

1996

94, 2010

Stassfurter Chem. Fabrik AG. * Stass-	near Elberfeld, removed in 1890 to Ür-	
furt * Possess various Gold Medals	dingen a. Rh., employs at present 150	
and Highest awards. Exhibit. of Potassi-	workmen.Manufact.alizarineforTurkey-	
um Cyanide, Potassium Cyanate, Ferro-	red dyeing Industry, alizarine dyes and	1
cyanide of Potassium and Urea. Also ma-	Intermediate products by own patens	
nufact.: Potassium Chloride, Potassium	processes, resp. provisional specificat.	
sulph., Kieserite, Magnesium sulph., Bro-	Also manufact. Bichromates a. other Cro-	
mine and Magnes. Chlor. 500 workmen.	mium salts of partic. kinds for Paint.,	
Prof. Dr. Stavenhagen * Berlin-Grune-	Colour manufacturing and Tanning. In	
wald, Humboldtstr.5 * Various appara-	the group "Chemistry of the Germ. Educ.	
tuses, Inorganic preparations. See p. 367.	Exhibition" a number of new Sulphonic	
Dr. Stock * Berlin, Hessische Str. 1/3 *	acids, Hydroxyl derivatives and Chlorine	
Apparat. for work. with liquefied gases,	products of the Anthraquinone series,	
Inorganic preparat. See p. 366 and 367.	prepared by own patented methods	
Prof. Dr. Stochr * Kiel, Chem. Inst. der	resp. provisional patents applied for.	
Universität * Preparations of the Py-	See p. 370.	
	Prof. Dr. Weinland * Tübingen, Neckar-	2015
razine series. See p. 371.	str.1 *Inorganic preparations. See p.367.	
Prof. Dr. Stoermer * Rostocki. III., Georg-	Prof. Dr. Wichelhaus, Geh. Reg. Rat *	2016
strasse 33 * Preparations of the Cu-	Berlin, Gr. Querallee * Apparat., Naph-	
marone series. See p. 370.	thol preparations. See p. 366 and 370.	
Prof. Dr. Thiele * Strassburg, Chem.	Prof. Dr. Windisch * Geisenheim * Ap-	2017
Inst., Goethestr. * Preparations of Ni-	parat. for the analysis of Wine. See p. 373.	2011
tramide, Amido-guanidine, &c. See p. 369.	Prof. Dr. Winkler, Geh. Hofrat* Dresden,	2010
Prof. Dr. Thierfelder * Berlin, Neue		2018
Winterfeldstr. 37 * Physiologico-chemi-	Terrassenuser 3 * Models, Germanium-	
cal preparations. See p. 372.	preparations, Indium and Hydrides	
Prof. Dr. Thoms * Steglitz-Berlin, Hohen-	of the Metals of Rare Earths. See	
zollernstr. 3 * Plans, Apparat. See p.372.	p. 365–367.	2019
Prof. Dr. Tollens, Geh. RegRat * Göt-	Theodor Wirsing * Schweinfurt a. (1). *	2019
tingen, Agrikchem. Laborat. * Appara-	Established 1833. Colours and Chemicals.	
tuses, Preparations of the sugar group.	Mineral, Wood and Aniline lacquer	
See p. 372 and 373.	Colours. Export to all parts of the	
Prof. Dr. W. Traube * Berlin, Pots-	world. See p. 367. See aduts. p. 5.	0000
damer Str. 5 * Synthesis of Uric acid	Prof. Dr. W. Wislicenus * Tübingen,	2020
and of Xanthine. See p. 369.	Universität * Apparatuses for Synthe-	
VereinigteChemischeWerke *Charlotten-	ses by means of Diethyloxalvacetate.	
burg * Lanoline, Glycerine, Fatty acids.	Prof. Dr. H. Wislicenus # Tharandt, Kgl.	2021
See p. 372 and 426.	Sächs.Forstakad.*Apparatuses,literary	
Vereinigte Fabriken für Laboratoriums-	works. See p. 365, 366, 369 and 373.	
bedarf, G. m. b. H. * Berlin, Chaussee-	Dr. L. Wöhler * Karlsruhe * Autooxy-	2022
str. 3 * Apparat. for Chemical laborat.	dation of Platinum. See p. 367.	
See grps. 19, 23, 83 and 140 p. 365-368,	Prof. Dr. Wohl * Charlottenburg, Bleib-	2023
371-373, 426, 489 and 498.	treustr. 49 * Gas Analysis, Inorganic	
Vereinigte Tonwarenwerke, AG. * Char-	and Organic preparations. See p. 365,	
lottenburg, Sophienstr. 8/17 * Sink &c.	367, 369, 370 and 372.	
for laboratories.	Prof. Dr. Wolffenstein * Charlottenburg,	2024
Prof. Dr. Vongerichten * Jena, Villa	Techn. Hochschule * Inorganic and Or-	
Frankenhäuser * Decomposition of Wor-	ganic preparations. See p. 365, 367,	
phine and of apiine. See p. 372.	371 and 372.	
Prof. Dr. Wallach, Geh. RegRat * Göt-	Carl Zeiss * Jena * Refractometer, Spec-	2025
tingen, Chem. Inst. d. Universität * Col-	troscopes, (Dicroscopes. Seegrps.19 and	2020
lect. of U. Meyer's Apparat. for determ.	140 p. 364, 369, 371, 373, 374, 376,	
Vapour Density, Preparations of the Ter-	378, 380, 415, 498 and 500.	8
pene series. See p. 365, 366 and 370.		
Dr. Hadakind & Tühinam Carter	Collective Exhibition of German	
Dr. Wedekind * Tübingen, Garten- strasse 4/5 * Preparations illustration	Perfumery Works.	
strasse 4/5 * Preparations illustrating	· ·	
Stereoisomerism of Nitrogen com-	Business Manager: Kgl. Kommerzien-	4
pounds. See p. 365, 367, 369 and 372.	rat Leichner, Berlin.	
R. Wedekind & Co. * Urdingen a. Rh. *	Georg Dralle * Hamburg und Altona *	2026
Chemical Factory, Est. 1886 at Leichlingen	Manufactory of fine Perfumes and Toilet	1

	soaps. Established 1852. Specialities: Dr. Dralle's Birch Hair-wash, "Sapo- dont" Dentifrice, "Violet-malattine" Cream for the Skin. Perfumes: Empress-	E. A. Lentz * Berlin * Factory for Laboratory fittings. Otto Pressler, Fabrik wissenschaftlicher Apparate * Leipzig.	2039 N 2040
	Viktoria-Augusta-Violet and Lily of the Valley. Toiletsoaps: "Ohne Gleichen," Florida Violet, Irisflower. See advertisements p. 5.	F. Sartorius, Fabrikwissenschaftlicher Präzisionsinstrumente * Göttingen and Rauschenwasser.	2041
2027	Jünger & Gebhardt * Berlin S.14 * Factory of fine Perfumes and Toilet soaps. Speciality: Lanoline Cream preparations.	Schmidt & Haensch, Optisch-mecha- nische Werkstätten * Berlin. Schott & Genossen, Jenaer Geräte und	2042 N
2028	Established 1873. B. Langwisch Nachf. * Hamburg, Merkurstrasse 34 * Factory of Perfumery, Powder and Rouge.	Röhrengläser * Jena. Vereinigte Fabriken für Laborato- riumsbedarf, G. m. b. H. * Berlin.	2044
2029	L. Leichner * Berlin SW., Schützenstr 31	Single Exhibitors.	
	* Steampower Works for Perfumery, Cosmetics, Powders and Rouges. Purveyor to the Royal theatres. Largest establishment in the world.	Berliner Ceresinfabrik Graab & Kra- nich * Rixdorf * Ceresine, Carnauba wax, Ozokerite, Lanoline and allied products.	2045
2030	Vereinigte Chemische Werke, Aktien- gesellschaft * Charlottenburg bei Berlin	Amber-Exhibition. See p. 431, 432.	2045.
2031	* Glycerine of various qualities, Lanoline and Lanoline preparations, Ammonia, Fatty acids manufactured by fermentation. See grps. 19, 83 and 140 p. 365-368, 371-373, 425, 489 and 498.	Paul Horn, Chem. Fabrik * Hamburg- Eilbeck * Established 1879. Factory for Spirit- and Oil-varnishes, dead var- nishes, Enamel- and glaze-Dipvarnishes, Polishes, Stains, Glue and Polishing materials.	2046
2031	F. Wolff & Sohn, Erste Karlsruher Parfümerie- und Toiletteseifenfabrik * Karlsruhe (Baden) * Established 1857. Branch houses Berlin and Vienna. Printing, Embossing, Joiner's Department, Factory of Fancy boxes. 3 Steam-engines	Alex Junkers, Farbentechniker * Berlin SW. * Factory of weather-proof Normal Mineral colours for painting and grounding, weather-proof, washable and unfading. See grp. 28 p. 437.	2047
	300 H.P. 3 Dynamos and 14 Electromotors. 520 Labourers and Employees. Specialities: Kaloderma for the skin,	Ölwerke Stern-Sonneborn, AktGes. * Hamburg * White Vaselines, white Vase- line oils, Dressing oils, Turkey Red oils.	2048
	Odonta for the teeth, Black Forest Pine preparations. 7 Prize Medals at International Exhibitions, Gold Medal Paris 1900, Diploma of Honour of Prince Kotohito of Japan, Osaka 1903. Wholesale Depots and Export Representatives at all European and Transatlantic capitals.	Fritz Schulz jun., AktGes. * Leipzig, Eger, Neuburg * Chemical Works with own factories for Tinplate-Packing boxes, Card-board boxes and wooden boxes. Largest Metal-polish Works in the world. Share Capital 5,100,000 M. Specialities: Globe Metal Polish, Globe Liquid-Polish, Glass Cleaner, Silver	2049
	In the German Hygiene Exhibition.	powder, siliceous Chalk. Solid and liquid "Globin" Leather polish. Brilliant	
	See Social Economy p. 494 and 500.	Starch, Furniture polish, also various	20
2032	Kaiserliches Gesundheitsamt * Berlin. See grps. 26 and 141 p. 428 and 500.	chemical technical products here exhibited. Directions for use in all lan-	20
2033	Chemisches Untersuchungsamt des Kgl. Polizeipräsidiums * Berlin.	guages. Yearly sale of Globe Metal Polish about 80 million tins. Own mines with Steam Sedimentation Works for	
2034	W. C. Heraeus * Hanau a. (1).	obtaining the raw material (siliceous	
2035	Prof. Dr. G. von Hüfner * Tübingen.	chalk) for Metal polishes. Gold Prize Medals awarded, the last one at the	
2036 2037	Kgl. Porzellanmanufaktur * Berlin. Fritz Köhler, Universitätsmechaniker	Paris Exhibition of 1900 (Collective Ex-	
2038	* Leipzig. A. Krüss, Optisches Institut * Hamburg.	hibition of German Chemical Industry). Trade mark: "Red stripe with Globe." Agents for U.S.A.: Raimes & Co., New York, 50 Ferry St.	

from dropping down. 12 Gold and Silver 2052 Vereinigte Glanzstofffabriken A.-G. * medals. 1901 Large Silver State-medal. Elberfeld * Lustrous fabric i. e. artificial Silk. See grp. 57 p. 467. Wholesale manufacture of elastic roofing-felt (with Tropical outfits, Isolating plates, Wood cement, &c.). See German Group 24. State Building p. 362. Manufacture of Paper. Group 26. 2053 Robert Dietrich, Inhaber der Firma Gebr. Dletrich, Papierfabrikant * Merseburg * Models, Plans and Designs for Employs 350 Workmen, and produces Public Works. daily 25,000 kg of Paper of all kinds, 15,000 kg of Cellulose, in its Factory 2060 Joint Exhibition of the Royal for machinery manufactures its own Prussian Ministry of Public Works Patent apparatuses for making Paper and Cellulose, of which apparatuses in Berlin. 550 have up to the present been sold. [A special Guide and Catalogue of the Ferd. Emil Jagenberg * Düsseldorf * Established 1878. Awarded Düsseldorf 2054 Collective Exhibition has been issued.) Models, Drawings, Photographs, In-1902: Silver State-Medal. 1. Engineerstruments, Publications relating to ing Works. Speciality: Machines for Hydranlic engineering, in particular the Paper-Industry, for Bookbinders Hydrographical undertakings: Levelland Paper-Box-Makers. Automatic Box ing and Water-mark departments, Break Machine, Automatic Labelling Machine waters, Ice breakers, and canal traffic. for bottles, tins, parcels, &c., Automatic Testing of natural building stones as to Tube Making Machine, Glueing., Gummtheir weather resisting qualities, Investigations about the resistance of ing- and Varnishing-Machines, Box Topping and Covering Machine, Paper Slitter and Rewinder, Automatic Book Ships and about Shipping; Statistics, River correction, Harbour works, Bridge Cornering Machine. 2. Roll Paper Works: Narrow Paper-Coils, Morse Tapes, building and Lighthouses, &c. Further with the collaboration of: Serpentines and Confetti. See grp. 28 Aktiengesellschaft"Weser" * Bremen * 2061 p. 437. Drawing of the Lightship "Borkumriff." Otto Metz & Co. * Coln a. Rh. * Paper 2055 Haniel & Lueg * Düsseldorf * Engineering, Iron and Steel Works. Established 2062 plates and serviettes for the Restaurant of the German State Building. 1873. About 2,000 Workmen. Model, 2056 Relchsdruckerel * Berlin * Hand-made Drawings and Description (specially paper with artistic water marks. See printed) of the Machinery for raising grps. 14, 15 and 17 p. 402, 404 and 410. ships at Henrichenburg on the Dortmund-Ems-Canal, for raising ships with Group 25. 600 tons freight up to a 16 m higher level. Prof. Dr.-lng. O. Intze, Geh. Reg.-Rat * Hachen * Preparatory works, Building 2063 Civil and Military Engineering. Heinrich Brink, Motor-car Factory * Wahlershausen-Cassel * See grp. 141 p. 2057 and Employing of dammed up Valleys for Water supply and Power stations, 500 and Education Exhibition p. 388. also for protection against Inundation in Rheinland and Westfalen, Schlesien Cordes & Co. * Hannover * Mining 2058 and Bohemia, Samples of stones and mortar. Model of the Urf Valley Reserbuildings. See grp. 116 p. 493. Weber-Falckenberg * Berlin * Firm established in 1876. Inventor and sole 2059 voir near Gemünd. J. W. Klawitter * Danzig * Model of a 2064 manufacturer of fire proof impregnated Twinscrew Dredger Barge, with bottom waterproof Linen fabrics for roofing, plates and watertight compartments. excellent for covering in military, railway-, factory- and agricultural build-Lübecker Maschlnenbaugesellschaft * 2065 ings. Exhibition buildings without tiles. Lübeck * Factory established in 1845, Covering of roof and wall surfaces of Joint-stock Company since 1873. Engineering Works with grey and case portable Barracks and Houses, acid proof for interiors of factories in which hardened Iron Foundry, Boiler and vapours ascend. Absolute protection of 500 Workmen. Shipbuilding Work.

Models and Drawings: Marine bucket-

ceilings. Prevents condensed vapours

dredger, Shaft suction-dredger, Dry See advertisements p. 21. dredger. 2065a Gebrüder Sachsenberg, G. m. b. H. * Rosslau i. Anhalt * Drawing of a Twinserew steamer and Suction-dredger. See advertisements p. 26. 2066 Schiffs- und Maschinenbau-Aktiengesellschaft * (Dannheim (Baden) * Shipyard, Engineering Works, Boiler Factory. Foundry. Established 1853. 500 Workmen. Dredgers and Elevators for Dredg. ing purposes. Steam yachts and Tugs in models and photographs. Slemens-Schuckert-Werke, G. m. b. H. * 2067 Berlin * Photographs and drawings of the Heligoland Lighthouse. Kreis Teltow (Teltow-Kanalbauverwal-2068 tung) und Havestadt & Contag, Kgl. Bauräte * Wilmersdorf-Berlin, Berliner Str. 157 * Construction of the Teltow Canal; Models, Drawings and Photographs of the Double-lock at Klein-Machnow. Vereinigte Waschinenfabrik Augsburg * 2069 Gustavsburg * Picture of the new bridge across the Weser at Nienburg. See Social Economy p. 494. 2070

German Hygiene Exhibition.

Kaiserliches Gesundheitsamt * Berlin * See grps. 23 and 141 p. 426 and 500. Götze, Direktor der Wasserwerke * Bremen * Model with drawing of a Plant for double-filtration.

Fahrzeugfabrik Heinrich Brink Cassel·Wahlershausen.

Siemens & Halske * Berlin.

2071

2072

2073

2074

Single Exhibitors.

Continentale Gesellschaft für elektrische Unternehmungen * Nuremberg * Drawings of projected and existing Monorail Hanging Railways. See grp. 74 p. 474.

North German Lloyd * Bremen * Model of the new fireproof Pier of the North German Lloyd in Hoboken N. J. (Harbour of New York). See grp. 75 p. 475.

2075

2076

2077

Siemens & Halske, A.-G. * Berlin SW., Askanischer Platz 3 * Model of the Triangle of the Berlin Elevated and Underground Railway.

Group 27.

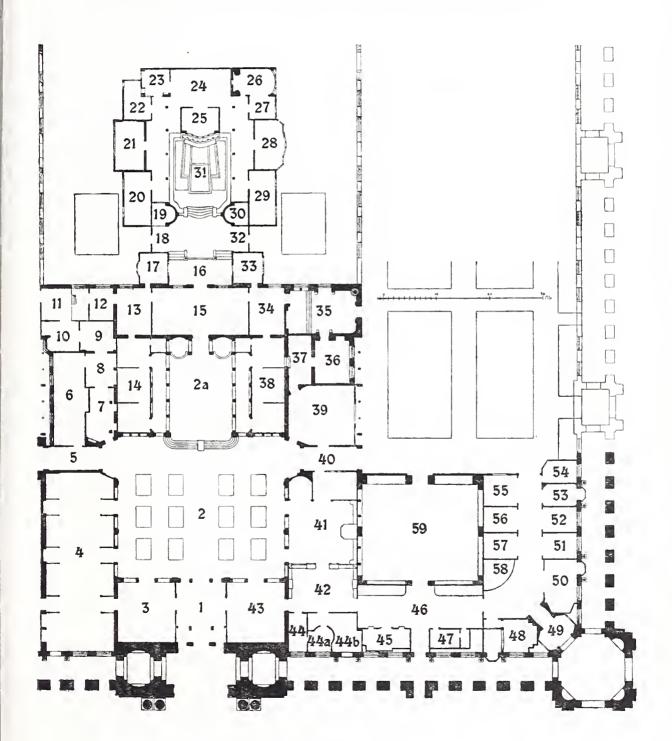
Architectural Engineering.

Boswau & Knauer, G. m. b. H. * Berlin, Branch establishments in Cologne, Hamburg, Hanover, St. Louis, New York * 5000 Workmen, 200 Buildings and Plants carried out yearly, 12 Medals and Prizes, Carried out and exhibited at St. Louis: a) Buildings: On our patented Special systems which often obtained Prizes, Masonry of the German House including Terraces and Pergolas of the German Restaurant, of the German-Tyrolese Alps and of the German Industrial Arts Department. Also single Exhibits: Porcelain Manufacture, Ministry of Education, State Railways, Bavarian Industrial Art Groups, South West German States, &c. See German State Building p. 359 and 362, German--Tyrolese Alps p. 506. b) Models: German State Building, German-Tyrolese Alps, Agricultural Home for Youth "Königin-Luise-Andenken." c) Sculptural work: Great Frieze of Industrial Arts Department, Sketches, Figures, Sculpture, Stucco ceilings Terrazzo floors. See grp. 37 p. 447. d) Drawings, Photographs, albums of finished Buildings and Plants.

Department D. Industrial products. (Palace of Varied Industries.)

1. Vestibule * 2. Large Hall * 2a. Hall of Honour * 3. Royal Porcelain Manufactory, Berlin * 4. Bronze Hall * 5. Passage * 6. Reading room of the Düsseldorf Town Library. Prof. Peter Behrens, Düsseldorf * 7. Hall of an Art connoisseur. Curt Stoeving, Berlin * 8. Reception Room. Prof. Alfred Grenander, Berlin * 9. Parlour. Prof. Alfred Grenander, Berlin * 10. Nursery with Bedroom. Arno Körnig, Berlin * 11. Dining room. Anton Huber, Berlin * 12. Boudoir.

Plan of the German Industrial Arts Department in the Palace of Varied Industries.



Rudolph and Fia Wille, Berlin * 13. Headmaster's Room of the New Industrial School at Nuremberg. Richard Riemerschmid, München * 14. Passage. Architectural Drawing and Designs * 15. State room of Bavarian Industrial Art (Landrat's Hall of the Bayreuth Couvernment Building). Prof. Martin Dülfer, München * 16. Front court. Prof. Martin Dülfer, München * 17. Reading room. Bertsch & Niemeyer, München * 18. Badenese Entrance hall * 19. Ante-rooms. Prof. Max Läuger, Karlsruhe * 20. Sitting room. Prof. Max Läuger, Karlsruhe * 21. Gentleman's room. Carl Spindler, St. Leonhard bei Börsch i. E. * 22. Tea-room * 23. Library * 24. Grey sitting-room * 25. Dining-room * 26. Music-room * 27. Smoking-room (22 to 27: Prof. Joseph Olbrich, Darmstadt) * 28. Music-room. Prof. B. Pankok, Stuttgart * 29. An art collector's reception room * 30. Ante-room to an art collector's reception room * 31. Courtuard with having 30. Ante-room to an art collector's reception room * 31. Courtyard with basin for water. Prof. Joseph (B. Olbrich, Darmstadt * 32. Baden ante-room * 33. President's study for the Government Buildings at Bayreuth. Bruno Paul, München * 34. The President's Reception-room for the Government Buildings at Bayreuth. Gebrüder Rank, München * 35. Music-room. Fritz Drechsler, Leipzig * 36. Reception-room of the Saxon House of Assembly at Dresden. Prof. W. Kreis, Dresden * 37. Ante-room with exhibition of Saxon objects of art. Prof. W. Kreis, Dresden * 38. Architectural drawings and designs * 39. Music-room. Prof. H. Billing, Karlsruhe * 40. Passage (Exhibition of Placards) * 41. Toy-room * 42. Amber room * 43. Orivit-Aktiengesellschaft, Köln * 44. Commercial Bureau of the Imperial Commissioner * 44a. Consulting room of the Commercial Bureau. Prof. Peter Behrens, Düsseldorf * 44b. Waiting-room of the Commercial Bureau. Prof. Peter Behrens, Düsseldorf * 45. Study. Magdeburg Group of Artists * 46. Gobelin room * 47. Saloon-cabin on a Norddeutsche Lloyd steamer. W. Kümmel, Berlin * 48. Reception-room. Leo Nachtlicht, Dipl.-lng., Berlin * 49. Hall * 50. Exhibition of the Künstlerinnen und Kunstsreundinnen in Berlin * 51. Room for a young lady. Arthur Biberfeld, Berlin * 52. Dining-room. Altherr & Ortlieb, Berlin * 53. Drawing-room. Marie Kirschner, Berlin * 54. Builder's office * 55. Drawing-room from the year 1813. C. Prächtel, Berlin * 56. Bedroom of the Biedermeier period. P. Ecke, Schmidt & Co., München * 57. Room of a collector of leather work. Georg Hulbe, Hamburg * 58. Imitations of old German silver objects (now in the possession of Harvard University) * 59. Ceramic-room.

	1. Joint Exhibitions,	
	comprising several groups.	
a)	Exhibit of the precious metal industry of	Hanau.
(1)	anager: Prof. (D. Wiese, Direktor der Kgl. Zeichenakademie, 1	lanau a. (1).

(Groups 11, 30 and 31.)

Group 11.

objects. Large and small silver-ware of all kinds. Established 1883.

Sculpture.

Otto Glenz, Elfenbeinschnitzer * Erbach
i.Odenwald * Figures and bowls carved
in ivory.

Königl. Zeichenakademie, Klasse für Emailmalen, Lehrer Hahn * Hanau a. (1). * Objects enamelled on metal, and painted on enamel and ivory.

Group 30.

Königl. Zeichenakademie, Werkstatt für Graviertechnik, Lehrer R. Wolff * Hanau a. (D. * Articles of silver, engraved enamelled, and Tula metal work.

Silversmith's and goldsmith's ware.

Königl. Zeichenakademie, Bljouterlewerkstatt, Lehrer L. Beschor * Hanau a. (1). * Articles wrought in gold and

Gebrüder Glaser * Hanau a.M. * Silverware Factory. Speciality: Antique

2089

2088

430

2091

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2092

INDUSTRIAL PRODUCTS silver with enamel and precious stones, Awarded prizes at Industrial Exhibitions at Kassel 1870, Vienna 1873, from designs by the Jewellery Design-München 1876, Philadelphia 1876, Meling class, Teacher H. Naas. bourne 1880, Nürnberg 1885, München Königl. Zeichenakademie, Zisellerwerk. 1888. London 1891, Scheveningen 1893, statt, Lehrer Prof. Offterdinger * Hanau Chicago 1893. a. (1). * Articles wrought in silver, for 2103 Wilh. lhm * Hanau a. M. * Ornaments of private use. precious metals with stones and enamel. Joh. Martin Krug Nachf. * Hanau a. M. * 2104 Fr. Kreuter & Co. * Hanau a. (1). * Spe-Enamel, articles of jewellery. ciality: Jewellery, fine gold trinkets. Ludwig Neresheimer & Co. * Hanau a. (1). Various ornaments. * Silver vessels, from old masters. Joh. Martin Krug Nachfolger * Hanau 2105 a. M. * Manufacture of Jewellery. Ott & Cie. * Hanau a. (1). * Silver ware: Atelier for enamelling. Established 1848. Awarded numerous prizes at Glass and Porcelain ware with galvanised silver mountings. first-class Exhibitions. J. D. Schleissner Söhne, Silberwarenfa-J. Sachsenweger * Hanau a. (1). * Gold-2106 brikanten * Hanau a. (17). * Speciality: warenfabrik. Speciality: Gold chains work in antique style. of all kinds. Established 1840. Driven Bernhard Wenig * Hanau a. W. * (Deby electricity. sign) Silver Tea Service (Executed by Gebrüder Schatt + Hanau a. M. + Manu-2107 Neresheimer & Co.). factory of Jewellery. Speciality: fine Gold jewellery, Rings, Pins, fancy Prof. M. Wiese, Direktor der Königl. articles, &c. Zeichenakademie * Hanau a. M. * Silver 2108 Ernst Schönfeld junior * Hanau a. (11). * and luory figures with gold orna-Manufactory for fine and gold ware. Established 1840. Necklaces, brooches, mentation, set with enamel and jewels. Collaborators: O. Glenz, Erbach i. O., Ornaments from L. Beschor. rings, articles in dull gold and jewellery. 2109 Steinheuer & Co. * Hanau a. (1). * Founded 1838. Manufacture of fine orna-Group 31. ment of gold and jewellery. Superfine and fine quality. Gold brooches set with precious stones. Jewelry. Bernhard Wenig, Teacher at the Royal 2110 Peter Deines Söhne * Hanau a. (D. * Academy of Drawing * Hanau a. (D. * Manufacture of fine trinkets. Design for ornaments in gold and platina with precious stones, executed C. Hertei & Sohn, Hofiuweliere * Haby F. Kreuter. nau a. M. * Established 1837. Manufacture of fine jewellery and gold 2111 H. Zwernemann * Hanau a. (D. * (Danuware. Speciality: artistic employment facture and Export of gold and silver of Barock pearls, objects of art and ware in every variety. lllustrated catalogue in all commercial languages. fancy in gold, silver and enamel. b) Exhibit of the Amber Industry, by the Royal Prussian Dinistry of Crade and Industry. Manager: Prof. Dr. R. Klebs, Königsberg i. Pr. (Groups 14, 23, 31, 32, 34, 41 and 116.)

Group 14. Group 23.
Original objects of Art Work- Chemical and Pharm.

manship.
Fritz Fehrmann, Goldschmied * Tilsit (Ostpreussen). Ornaments and productions in precious metal with real amber. Awarded Prize medals: Tilsit 1891, Königsberg 1895.

Chemical and Pharmaceutical Arts.

Hermann Schwarz * Magdeburg * Manufacture of all kinds of oil and spirit varnish. Established 1861. Awarded Gold Medal Paris 1900, and Grand Prix in the Collective Exhibit of the

2115

2094

2095

2096

2097

2098

2099

2100

2101

Amber Industry. Speciality: Amber varnishes, shown in liquid samples for industrial purposes and house-painting. The firm constantly supplies the Royal Railway and Military Authorities, the Imperial Navy. Ship-building yards, and Industries of the most varied kinds at home and abroad.

Carl Tledemann * Dresden * Oldest Amber Varnish Manufactory. Founded 1833. Speciality: Tiedemann's quickdrying, colored Amber Varnish for floors, an important hygienic factor in living rooms, also Amber Enamel varnish paints. Samples and specimens of both articles. In tins for export with German, French, English, Spanish, Italian, and other labels. Gold medal Paris 1900.

Group 31.

2116

2117

2118

2119

2120

2121

2122

Jewelry.

Fritz Fehrmann, Goldschmied * Tilsit (Ostpreussen) * Ornaments and Works of Art in precious metal with real amber. Medals awarded: Tilsit 1891, Königsberg 1895.

Paul Hübner * Berlin, Markusstr. 5 * Manufacture of Sleeve-links, Brooches, Pine

Aug. F. Richter * Hamburg * Manufacture of jewellery. Established 1846. 400 Employees. Manufacture of personal ornaments, artistically executed in gold, silver, gold-plated, &c. from original designs by famous artists. Novelties constantly. Many patented systems. Large Export. Sole representative: F. Rosenstern & Co., New York, 85 Leonard Street.

Fr. Rosenstiel, Hoflleferant * Berlin NW., Unter den Linden 48 * Artistic and commercial articles in Amber.

A. Zausmer * Danzig, Langgasse 10 * Manufactory of Amber Goods. Established 1876. 18 Prize medals. Exposition Universelle Paris 1900 Grand Prix.

Group 32.

Clock and Watch making.

Etzold & Popltz * Leipzig * Established 1864. Manufactory of modern house clocks, about 200 workmen. 10 Prize medals, the most recent Leipzig 1897, Berlin 1903. Specialities: Wall clocks. table or hanging clocks, time-pieces, house-clocks (also with chimes) in all prices and styles to the finest productions of art and industry. Sample stores or representatives in Leipzig, Berlin, Cöln, Paris, Athen, Madrid, Apeldoorn (Holland).

Louis Müller & Co. * Biel (Schweiz) * Watch Manufactory. All kinds of watches in 101/2" (00 size). Steel, silver and gold. Speciality: Fancy amber cases from Königsberg i. Pr.

Group 34.

Fancy Goods.

A. Lehmann * Königsberg i. Pr., Steindamm 79/80 * Turnings and carvings in Amber, Ivory, and Wood. Many Prize medals.

Fr. Rosenstlel, Hoflleferant * Berlin NW., Unter den Linden 48 * Established 1825. Artistic and useful articles in Amber.

Verelnigte Pfelfenfabriken vorm. Gebh. Ott & Zlener und Ellenberger A.-G. * Nürnberg * Employs about 200 persons and manufactures tobacco pipes of Bruyère wood, cigar- and cigarette-holders of Amber, Ambroid, &c. Export to all countries. Firm of Gebh. Ott, established 1865. Awards: Philadelphia 1876, Wien 1873, Nürnberg 1882, Lelpzig 1880 and Amsterdam 1883.

A. Zausmer * Danzig, Langgasse 10 * Manufactory of Amber Goods. Established 1876.

Group 41.

Hardware.

Adolf Amsberg * Aachen * Bronze door-handles and window-handles in combination with amber, ivory, buffalo-horn, &c.

Group 116.

Minerals and Stones, and their utilization.

Adolf Amsberg * Aachen * Bronze door-handles and window-handles in combination with amber, ivory, buffalo-horn, &c.

Prof. Dr. R. Klebs, Kgl. preuss. Landesgeologe * Königsberg i. Pr. * Rare finds of amber, animal and vegetable remalns embedded in amber. See p. 431. 2123

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	INDUSTRIAL PRODUCTS	
2131	Königliche Bernsteinwerke * Königsberg i. Pr. * Amber in the rough, Ambroid (Pressed Amber), liquefied Amber, Amber Oll and Amber acids. Fine specimens. A. Lehmann * Königsberg i. Pr., Stein-	2133
	c) Exhibit of the "Verein der Künstlerinnen und Kunst- freundinnen" * Berlin. Management: Marie Kirschner * Berlin W. (room 50). (Groups 9 to 11, 14, 30, 31, 33, 37, 38, 43 and 58.)	
	Group 9. Paintings and Drawings. Anna Lent, Artist * Berlin W. * Artistic Placards: 1 Placard for a Periodical, 1 Placard for Pianos in	2146
2136	Mathilde Block-Niendorff * Berlin, Bü- lowstr. 104 * Miniatures on lvory: Emma Lobedan * Berlin, Hafenplatz 5 * Portraits of his Majesty the Emperor and her Majesty the Empress. Distemper. Coriginal Etching of Castle Rheinsberg with tarsia work frames.	2147
2137	Gertrud Burger, Portrait painter * Berlin, Cauenzienstr. 10 * Miniatures on Lützowstr. 60 * Etchings. lvory: Portraits, Head after Boucher, Bertha Schrader * Dresden, Christian-	2149
2138	"Nymphe," Original. E. von Eicken * Halensee (Berlin), Hobrechtstr. 10 * Faience Plates, painted before glazing. Landscapes and Marine paintings in dark blue frames. strasse 19 * Coloured Lithograph of the old Augustusbrücke in Dresden. Gertrud Stechow * Friedenau (Berlin), Rembrandtstr. 11 * Etchings.	
2139	Claire v. Gersdorff, Hosdame Ihr. (D. der Kaiserin * Potsdam * Original Sketches from Lise: His Majesty the Emperor, His Imperial Highness the Crown Prince, &c. Cornelia Paczka-Wagner * Berlin, Lützowstr. 60a * A Bronze.	2151
2140	Anna Höchstedt * Berlin, Burggrafen- strasse 12 * Miniature on lvory, "Travelland" in black was der Str. 5 * Bronzes, upright Cand-	
2141	Dorothea Kellner * Berlin, Altonaer- Str. 16 * Enamelled miniature Portraits on luory. Bertha non Kitzing * Berlin Regens.	
2142	burger Str. 2 * Porcelain: Tête-à-tête In the style of Frederick the Great, painted from old designs. Original Industrial Art Work. Elisabeth Ankermann * Berlin, Uhland- strasse 48 * Writing cases in real leather.	2153
2143	etrasse 44 + Fnamel paintings slightly toned, embossed and stained.	
2144	strasse 4a * Service painted blue on white ground. Liqueur service of Bohemian glass, painted with enamel colours before burning.	4.5
	Henny Deppermann * Berlin, Nettelbeckstr. 24 * Fans painted on white silk, "Nixen im Mondschein." Awarded medals München, Chicago, Lübeck, Berlin.	
2145	Clara Elisabeth Fischer, Artist * Berlin, Potsdamer Str. 121a * Lithographs. Atelier for lady students in all branches of art. Clara Elisabeth Fischer, Artist * Berlin, Uiktoria-Luise-Platz 5 * Fans, painted and worked in lace. Fans painted in correct style for antique frames.	

2157	Clara Goldmann * Berlin, Martin- Luther-Str. 84 * Mirror in red maho- gany frame with tarsia work of flying sea-gulls.	Sconce of wrought brass, watch in embossed case with metal ground. Warie Kirschner * Berlin, Steglitzer	217
2158	J. Hansing * Hannover * Schule für Malerei u. Kunstgewerbe. Speciality:	Str.21*Umbrella-stand of dull-polished brass fitted with blue-green Tiffany glass.	
	Leather-work. Elegantly bound Bible with coloured and hand-worked leather binding with artistic lock.	Eina Krause * Berlin, Burggrafenstr.12 * Book-slides of wrought-iron, brass, copper, and pinch-beck.	217
2159 2 160	Anna Höchstedt * Berlin, Burggrafen- strasse 12 * Fans. Warle von Keudell, Lady landscape	Clisabeth Neelsen * Berlin, Kurfürstenstrasse 73 * Wrought-iron two-armed	217
	artist * Berlin, Königgrätzer Str. 31 * Screen. Mahogany frame with 3 pastel drawings. Views of the upper Spree, Havel and Potsdam.	candlestick. Sophie Luise Schlieder * Berlin, Kleiststrasse 40 * Lamps, the bulb under mother-of-pearl shells. Music-stand of	217
2161	(Darle Kirschner * Berlin, Steglitzer Str. 21 * Glass vases and artistic glasses.	bronze, Metal Bell with mock-jewels.	
2162	Hildegard Lehnert und Clara Lobedan * Berlin W. * Artistic Ceramics, Stone- ware vases with smooth glazing and	Decoration and fixed Furniture of	
2163	with galvanic precipitation. Warie Victoria Peller * Berlin, Lützow-	Buildings and Dwellings.	217
	strasse 111 * Award Prize Karls- ruhe. Exhibition of Fans. Fan: Red- currants. Fan: Chasing Butterflies.	Gertrud Wunder * Jena, Ziegelmühlen- weg 15 * Spinning-wheel and stool richly scalloped, of dark-brown stained wood.	217
2164	llse Schütze, Artist * Charlottenburg * Folding-screen with painted frieze of heads of praying children. Ground-	Group 38.	
1	work with poppy ornamentation by Clara v. Sivers.	Office and household Furniture.	
2165 2166	Clara von Sivers * Halensee (Berlin), Georg-Wilhelmstr. 19 * Hand-weaving "Flying sea-gulls" on grey ground.	(Daria von Brocken * Berlin, Lützow- platz 12 * Glass-cupboard of mahogany with wood-carvings and bronze fittings in Empire style.	217
2100	Sylter Hausfleissverein * Insel Sylt * President: Exzellenz von Versen, Berlin. Woven woollen rugs and cushions in Scherrebeker style.	Baronesse (D. v. Buddenbrock * Berlin, Eisenacher Str. 112 * Tea-table and chair of satin-wood with tarsia work.	217
	Group 30. Silversmiths' and Goldsmiths' Ware.	Table with undershelf and small flaps. E. Dillmann, Artist * Charlottenburg, Fasanenstr. 24 * Double chairs with carved back and seat (Ornamentation: Roman ivy). Polished mahogany.	217
2167	Dorothea Keliner * Berlin * Altonaer Str. 16 * Enamel miniature portraits on copper and silver.	Freifrau Mary von Falkenstein, geb Garraway * Berlin, Potsdamer Str. 20 a * Music cupboard, grey oak with silver-	217
	Group 31.	-tin fittings. Clara Elisabeth Fischer, Artist * Ber-	217
2168	Jewelry. lise v. Cotta * Berlin, Potsdamer Str. 39 * Ornaments in wrought silver and	lin, Potsdamer Str. 121a * Small pillared cupboard of grey wood, iron mountings on the doors.	
	decorated with half-precious stones. Original work.	Marle Kirschner * Berlin, Steglitzer Str. 21 * Book-stands with metal mountings and handles. Chairs, rests, &c.,	218
	Group 33.	table.	
2169	Productions in Marble, Bronze, Cast-Iron and Wrought-Iron. Hedwig v. d. Gröben * Pau, Südfrank-	Lina Krause * Berlin, Burggrafenstr. 12 * Oak Book-case with iron mountings on the doors. Tea-table, mahogany	218

	INDUSTRIAL	PRODUCTS	
2182	HIIdegard Lehnert und Clara Lobedan * Berlin * Wooden partition in grey oak inlaid. Tables of grey wood with tops of etched glass.	Martha und Hedwig Endell * Wilmersdorf, Durlacher Str. 11 * Carpet, made by the artists themselves.	2191
2183	Hanna Mehls, Artist for Trade and Artistic purposes * Berlin, Wittenbergplatz 3 * Writing-desk chair of ma-	Group 58.	
	hogany with bronze work on the arms.	Lace embroidery and trimmings.	2102
2184	Clisabeth Neelsen * Berlin, Kurfürstenstrasse 73 * Mirror in grey wood.	Martha und Hedwig Endell * Wil- mersdorf, Durlacher Str. 11 * Curtain of tulle and coloured silk with em-	2192
2185	Maria Philip, Furniture Designer * Ber- lin, Wichmannstr. 14 * Show-case coated with brown Martin varnish.	broidery. Helen lucrsen * Berlin, Nettelbeckstr. 5 *	2193
2186	Elisabeth Schellbach * Friedelshof bei	Half worked and half painted cloth, an ear-pattern, made by the exhibitor.	
	Königs-Wusterhausen * Workshops for plain house-furniture, book-decoration and exlibris. Tea-table with tarsia work.	Marie Kirschner * Berlin, Steglitzer Str. 21 * Grand-piano-cover, chenille-embroidery with silver-spangles. Screen, embroidered and painted. Curtain with	2194
2187	Sophie Luise Schlieder * Berlin, Kleist- strasse 40 * Sofa of grey oak with	poppies.	
	tarsia work. Palm-stand. Table with glass tops.	Lina Krause * Berlin, Burggrafenstr. 12 * Embroidered curtain, made by Marg. Helbig and E. Oesten, Berlin, Wilhelm-	2195
2188	llse Schütze, Artist * Charlottenburg * Sideboard of mahogany in Biedermeier	strasse 128.	2400
2100	style with tarsia work.	Emmy Luthmer * Berlin, Uhland- strasse 44 * Embroidered velvet hang-	2196
2189	Margarethe Vorberg * Bugeshalde bei Neu-Babelsberg (Berlin) * Grev wood	ings, appliqué of velvet and silk bor- dered with rope-work.	
	chair upholstered in cloth, studded with nails.	Freifrau von Maltzahn * Spandau, Stresow 16 * Table-cloths, table-centres,	2197
	☐ Group 43. ☐	and cushions, worked on silk and linen. Clara von Sivers * Halensee (Berlin),	2198
	Carpets, tapestries, and fabrics for upholstery.	Georg-Wilhelm-Str. 19 * Screen: Pea- cock in silk-embroidery on three-fold carved screen. Embroidery.	
2190	E.v.Eicken * Halensee (Berlin), Hobrecht- strasse 10 * Gobelins painted from nature. Decorative forest interiors.	Emma Wirth * Stuttgart, Gaisburg- strasse 4A * Blue and white worked table-cloth.	2199
	d) Exhibit of the "Vereini im Handwerk, G. m		
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	Show-case containing small artibronze, ivory, and wood, from de	esigns and models by various artists.	
	(Groups 11, 14, 30	, 31, 32 and 33.)	
	Group 11.	Fritz Christ * "Judith," Bronze on serpentine pedestral.	2204
2202	Sculpture. Eugen Berner * Seal "Das Schweigen,"	Theodor von Gosen * Bronze-statuettes: "The Bather," "Jewel-bowl,"	2205
	carved in wood.	"Baby."	2222
2203	Sophie Burger-Hartmann*Small plastic articles in livory and silver, silver and bronze.	Prof. Karl Gross * Carved ivory: Paper- knife, seal, candlestick, memorandum- block.	2206
	hZ	Б	

2207	Prof. Ludwig Hablch * "Reading Desk," "Water Sprite," "Rock goat," "Nixie," "Key", (Bronzes).	Max Daslo * Silver Brooches. Theodor von Gosen * Silver Brooches and Clasps.	2225 2226
2208	Ulfert Janssen * "Mermaid," Bronze Candlestick.	Prof. Karl Gross * Gold and Silver Broo- ches and Necklaces set with stones.	2227
2209	Hugo Kaufmann * "Mirror," Bronze on onyx stand.	Paul Haustein * Silver necklace set	2228
2210	Ludwig Kindler* "Jewel bowl," "Young faun" (bronzes).	with stones, Brooches, Clasps, Pendants. Hermann Hirzel * Gold Brooches set	2229
2211	Prof. Ignatius Taschner * Bronze sta- tuette "Boy Lying." Else Weigel * "Female figure," bronze.	with Stones Enamel. (Deta Honigmann * Necklaces, Brooches, Clasps; Silver Studs and Box with Stones or Enamel.	2230
	Group 14.	Prof. F. A. O. Krüger * Silver clasp with Brilliants and Opals.	2231
	Original Specimens of Art Work- manship.	Hermann Obrist * Wrought Silver Belt-Clasp with green Spinelle.	2232
2213	Prof. F. A. O. Krüger * Ornamental Glass, blown in front of a flame.	Else Sapatka * Cloak Clasp, Bracelet. Theodor Schmuz-Baudiss * Silver Brooch.	2233 2234
2214	Clse Sapatka * Jewel-case in maple- wood with silver-plated mountings.	Prof. Ignatius Taschner * Silver Brooch.	2235
2215	J. J. Scharvogel * High temperature ceramics, with flowing glazing.	Group 32.	
	Group 30.	Watch and Clock making.	
	Silversmiths' and Goldsmiths' Ware. See p. 434.	Ferdinand (Dorawe * Timepieces with metal Dial-Plate, in Carved Wood or richly Inlaid.	2236
2216	Markus Behmer * Champagne cup in sliver with etched ornamentation.	Group 33.	
2217	Eugen Berner * Silver Tea-Service; Cup with Tula-work.	Productions in Marble, Bronze, Cast Iron and Wrought Iron.	
2218	Theodor von Gosen * Silver Epergne; Serviette Ring.	See p. 434.	
2219	Paul Haustein * Candlestick and Boxes in enamelled silver. Enamelled vessels	Eugen Berner * Bronze vase covered with patina of bronze alloy.	2237
2220	set in silver and bronze. Meta Honigmann * Wine-jug, enamel	Walter Elkan * Metal work in japanese metal alloys, covered with patina; vases and ash trays.	2238
	with silver mounting; Flower stands, enamel with bronze mounting on wrought iron stands.	Paul Hausteln * Liquer stand, silvered copper, tea service and tray wrought	2239
2221	Ludwig Kindler * Inkstand, enamel with silver setting.	in copper. Hermann Hirzel * Vase of Japanese	2240
2222	Richard Riemerschmld * Silver knife, fork, and spoon	metal alloys. Ludwig Kindler * Writing set, in	2241
2223	Else Sapatka * Lorgnon in silver and enamel, Serviette Rings, Cups, Silver	bronze. Elena Luksch * Table clock "Dachaue-	2242
	Stoppers, Enamelled Vases set in Bronze.	rin," in bronze. Richard Riemerschmld * Candlestick,	2243
	Group 31. Jewelery.	brass. Else Sapatka * Tray, wrought copper.	2244
2224	Sophie Burger-Hartmann * Silver Brooches and Belt-Clasps.	Theodor Schmuz-Baudiss * Vases in bronze, inlaid with Japanese metal alloys.	2245

2. Single Groups.

Group	28.	
Station	ery.	

[Palace of Liberal Arts].

G. Bormann Nachfolg., Inhaber Max Otto, Kgl. Hoflieferant * Berlin C. 2 * Manufact. of finest indelible Artists colours, Indian lnk and lnks Oilcolours, Water-colours, Pastel Colours, General Staff Colours and Plan Colours. Coloured Chalks Drawing, Copying and tracing paper. Awarded Prize Medals at the Exhibitions at Wien Awarded Prize 1873, Berlin 1878 and 1879, Melbourne 1888, Chicago 1893, Berlin 1896, Awarded the Prussian State Medal 1896. The factory (originally J. Steiner) has been in existence about 100 years.

A.W.Faber * Stein bei Nürnberg (Bayern) * Pencil manufactory. The manufactory has been in existence since 1761. All kinds of pencils and coloured pencils for Artists, Architects, Engineers, Offices, Schools, &c. All kinds of holders for artists' pencils and crayons. Rulers, Squares, Drawing-Scales, Calculating-Scales, TSquares, Inks, Artists' Colours, Indian lnk in cakes and liquid. India--rubber for artists, plain and fitted in wood, India-rubber bands. The firm employs 1,000 Workmen. Branches in Geroldsgrün, Berlin, Noisy-le-Sec, London, New York, Newark. Steam and water power, together 300 H.P.; 20 Gold medals and First Prizes. Grand Prix. highest award, at the Paris Exhibition 1900. Registered Trade marks: A. W. FABER and A. W. F.

Ferd. Emll Jagenberg * Düsseldorf a. Rh. * Pasting machines, machines for making Card-board Boxes, Machinery for Book-binding and Paper-Work. See

grp. 24 p. 427. Alex Junkers, Farbentechniker, Fabrik wetterfester Normal-Mineralfarben für Malerei und Anstrich *Berlin SW.13 * Colours for painting Facades and Churches on lime and cement plaster, washable, proof against weather and light. See Paintings grp. 37 p. 445 Artists Guhr & Männchen. See grp. 23 p. 426.

J. Landauer * Braunschweig * Tracing Ilnen and materials for Bookbinders. Established 1852. Silver medal Parls 1900 (first time of Exhibiting). Branches: New York (Alfred Stepan, 76 & 78, Park Place), Berlin, Brüssel, Budapest, Hamburg, London, Paris, Wien. Tracing linen.

Meyer & Kersting, Inhaber Heinrich Kersting *Karlsruhe(Baden)*Apparatus and Platina-Irid Burner for Pyrography. C. W. Motz & Co. * Berlin W.-Schöneberg * Speciality: Drawing Pins. Output 500,000 Pins per Week. Inventor of the steel pin in one piece. Export to all countries. Bernhard Münz, Galanterie- und Schrelbwarenmanufaktur * Nürnberg * Speciality: Original and Unique writing Requisites. Own Inventions. Sächsische Relsszeugfabrik F.E. Hertel & Co. * Neu-Coswig-Dresden * Mathematical instruments in all systems. Paul Süss, A.G. * Mügeln-Dresden *

See advertisements p. 27.

Congratulating and post cards.

Group 29. Cutlery.

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[Palace of Liberal Arts.]

Friedrich Dick * Esslingen a. Neckar * Knives, Butcher's Steels, Choppers, Carving and Table Knives and Forks. (Machinery). See grps. 30 and 65 p. 438 See advertisements p. 27. and 471. C. Friedr. Ern * Wald (Rheinland) * Manufactory of hollow-ground Razórs. Established 1873. First and most important of its kind. Patent forging and grinding Process. 1904 about 500 Workmen. Annual Production about

170,000 dozen. Export to the United States about 50,000 dozen. Sliber State medal, Gold medal at the Düsseldorf Exhibition 1902.

J.A. Henckels-Zwillingswerk * Solingen

Trade Mark: Registered "The Twins" 13. June 1731

Purveyor to the Royal Prussian and Grecian Courts, Steel-ware Manufacturer to the Imperial and Royal Austrian Court. Number of Workmen 2,300. Export to all countries. Steel-ware of all kinds of best quality: Knives and Forks. Knives for all purposes, Pocket-knives, Gardening Knives, Couteaux de chasse, Razors and Shaving Apparatuses, Scissors for all purposes, Corkscrews, Instruments for manicure, &c. The Firm has its own Cast steel Works. High Distinctions awarded: Berlin 1844, Leip. zig 1850, London 1851, Düsseldorf 1852, New York 1853, Paris 1855 (Médaille d'honneur), Wien 1873, Düsseldorf 1880, Antwerpen 1885, Berlin 1896 (Gold

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State (Medal), Chicago 1893, Paris 1900 (Grand Prix), Düsseldorf 1902 (Gold Medal). Branches: Berlin, Dresden, Frankfurt a. M., Hamburg, Cöln and Wien. Sole Representative for the United States: Graef & Schmidt, New York, 107, Chambers Street.

Group 30.

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Silversmiths' and Goldsmiths' Ware.

Exhibit of the Edelmetallindustrie zu Hanau * See p. 400 and 440.

Exhibit of the "Verein der Künstlerinnen und Kunstfreundinnen" * Berlin * See p. 399 to 401, 440, 441, 456, 457, 461 and 467.

Exhibit of the "Vereinlate Werkstätten, G. m. b. H." * München * See p. 400, 401, 440, 441, 448, 459 and 465.

A. Berger, Jeweller * Dresden * Silver Inkstand with Penholder. See grp. 37 p. 449.

Berliner Electro-Plated-Waren-Fabrik, G.m.b.H. * Berlin, Ritterstr. 90 * Electroplated articles for the Table. Speciality: Crystal mounts, Novelties, Hotel Fittings. Representative: Brüder Rachmann of Haida (Bohemia).

Prof. E. F. Berner * Stuttgart * Enamelled casket. See grp. 37 p. 455.

Bertrand, Jeweller* Dresden * Hammer and bell for the City Council, copper and silver with tarsia work, designed by Margar. Junge. See grp. 37 p. 449.

C. A. Beumers * Düsseldorf a. Rhein * Ateliers for ecclesiastical and secular Objects of art. Established 1850. State medal and Gold medal Düsseldorf 1902. Highest award for Industrial art. The articles were the only ones of the branch from Rhineland and Westphalia that were admitted into the National Art Exhibition at Düsseldorf 1902. Received important commissions for the Royal Museums for Art and Industry in Berlin and Stuttgart, was entrusted with work for the Germanic Museum, Harvard University, Cambridge, which, however, was not executed by the galvano plastic method but by hand. Speciality: Reproduction and restoration in enamel, gold, silver, and bronze, of objects of artistic and historical interest. Work of this kind executed by the firm are important objects in the collection of Prince Hohenzollern, the treasures of the Siegburg parish church, 11th to 15th century enamels, the treasures of the church at Hochelten, the shrines of the St. Vitor. Xanten and many others. Number of workmen: 25, motors developing 4 H.P. See grps. 32 and 37 p. 441 and 448. Emil Binder, Bisouteriefabrik * Pforzheim * Established 1888 * Speciality: Enamel jewellery, souvenirs, silver goods. Prize medal Chicago. Several See grp. 31 Patterns and Patents. p. 440. See advertisements p. 21. Wilh. Birmelin (Representative Gebr. Schiff) * Pforzheim * Enamel jewellery in modern style from designs by German artists. See grp. 31 p. 440. B. Bohrmann Nachfolger * Frankfurt

a. M. * Manufactory of electro-plated table-silver. Especially for hotel and restaurant use. Purveyors of all the electro-plated table-silver used by the "Deutsches Weinrestaurant Kons & Pfennings." See p. 362.

P. Bruckmann & Söhne* Heilbronn a.D. * Silver, marble, and bronze fountains: allegorical representation of German music. Designed by Prof. Otto Rieth. Silver objects. See grp. 37 p. 454. Friedr. Dick * Esslingen a. N. * Tools

for Goldsmiths and silversmiths. (Machinery Hall.) See grps. 29 and 65 p. 437 and 471. See advertisements p. 27. Leopold Eberth* München * Silver, Precious metal and stones from designs by MaxPfeiffer, München. Seegrp. 31 p. 440. Emmy v. Egidy * München * Silver bowl. Seegrps. 14 and 31 p. 401 and 440. Eisenhütten- und Emaillierwerk Neusalz a. O. * (Principal W. von Krause, Berlin.) Established 1827. 1,400 workmen. Articles exhibited: Artistic enamelling on chased copper, partly original work, partly copied from old masters. Other productions of the Works: Cast-Iron goods of all kinds, builder's and machine castings. Household utensils. Cast enamel goods, baths, &c. Pumps for household and industrial purposes. Stable Fittings. Lavatories. Prize medals awarded at Paris, London, Berlin, Breslau, Frankfurt a.O., Porto Alegre, &c. Represented by Brüder Rachmann from Haida. See advertisements p. 16. Ferd. Hardt, Lehrer an der Kunstgewerbeschule * Pforzheim * Art enamel

paintings and miniatures. Gabriel Hermeling * Cöln a. Rh. * Court Goldsmith and Enameller. Holder of the Large gold State medal. Table-silver, decorative articles, church requisites, enamel work. Objects of art.

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€. Kayser * Cöln a. Rh. * Court Pur-2278 vevor für die Firma J. P. Kayser Sohn * Crefeld * Articles for Use and Ornament of Kayserzinn. Gold medals: Paris 1900. Düsseldorf 1902, Turin 1902. See advertisements p. 3. 2279 Mau, Court Jeweller * Dresden * Inkstand and Pen-holder for the Dresden City Council. See grp. 37 p. 449. Milde, Jeweller * Dresden * Hammer 2280 and Bell for the Dresden City Council, in silver and lvory, designed and modelled by Gertrud Kleinhempel. See grp. 37 p. 449. 2281 Prof. Friedrich von Miller * München * Jonas Drinking-cup, State Goblet, small silver figures. See grp. 37 p. 447. 2282 Orlvit, Aktiengesellschaft für kunstgewerbliche Metallwarenfabrikation vorm. Bronzegiesserei Ferd. Schmitz * Cöln a. Rh. * Branches: Berlin, Hamburg, Paris, Wien. Articles for Use and Ornamentation in Sterling silver, Silver-plated Hard-metal (New Silver), Orivit metal. Paris 1900 Gold medal, Düsseldorf 1902 Gold medal, Silver State medal. See grp. 65 p. 471. 2283 Plrner & Franz, Erzgiesserei & Dresden. A. * Established 1881. Monuments, Small artistic articles in Silver and Bronze. Ballot-box in Bronze for the Dresden City Council. See grp. 37 p. 449. 2284 Metallwarenfabrik für Kleinkunst Walter Scherf & Co. * Nürnberg * Brands "ISIS" and "OSIRIS." Articles for Use and Ornament in "Osiris" metal in combination with fine Crystal, Dajolica, &c. artistically executed, especially: Electric Lamps, Candlesticks, Vases, Clocks, Caskets, Mirrors, Jardinières, Writing necessaries, Tablesilver, &c. Established 1899, about 100 Persons employed. Awarded the Gold medal of the King Ludwig Preis Stiftung "for the very tastefully and from a technical point of view, excellently executed artistic and useful metal work." Large Gold medal of the "International Exhibition of Art and Industry, St. Petersburg 1903/04." See grp. 33 p. 443. 2285 C. C. Schirm, Ateller für Emalle * Grunewald b. Berlin * Inlaid Enamel. See grp. 37 p. 455. Prof. Adolf Schmld * Pforzheim * 2286 Silver Inkstand. See grps. 11 and 37 p. 400 and 446. Johannes Seiler, Sculptor * München, 2287 Karlstr. 45 * Wall-fountain, Dressingglass, Card-Tray in Bronze.

Steinicken & Lohr * München * Metal 2288 Articles of all kinds from Designs by O. Lohr, A. Hohlrein and Ignatz Taeschner in München. See grp. 37 p. 447. J. H. Werner, Court Jeweller to His Ma-2289 jesty the Emperor * Berlin W. 8, Friedrichstrasse 173 * Gold and Silver Wares. See p. 361 and grp. 31 p. 440. M. H. Wilkens u. Söhne, Silberwaren-2290 fabrik * Hemelingen * Table silver. See qrp. 37 p. 455. Carl Winterhalter, Royal goldsmith * 2291 München * Decorative Articles and Drinkings-cup in Silver. See grp. 37 p. 447. August Witte, Päpstlicher Hofgold-2292 schmied und Stiftsgoldschmied * Aachen Ecclesiastical and secular Objects of Art and Enamels.

Galvanic Reproductions of German Silver Work.

Eduard Wollenweber, Hofsilberarbeiter

* München * Decorative Articles in

Silver. See grp. 37 p. 447.

2293

(Collective Exhibit.)

After His Majesty the Kaiser had presented to the Germanic Museum of Harvard University, Cambridge, Mass., a collection of plaster casts of German Sculptures and Architectural Work, a number of Germans resolved to supplement the Imperial gift by a similar, though more modest endowment. It was decided to have galvano-plastic copies made of the firest silver-work from the best period of German Civic art. The nucleus for such a collection had been previously created by industrial Art Institutes in Berlin, Vienna, London and Paris. The best specimens were selected from these under the direction of the Royal Museum for Art and Industry in Berlin, and a further series of new reproductions made. The valuable originals were most willingly lent for the purpose by His Majesty the Kaiser, by other German Princes, by Towns, Guilds, and Museums.

This collection of 55 articles furnishes an excellent representation of German Goldsmiths' art from the 15th to the 18th century. The most celebrated art centres in North and South, especially Nürnberg and Augsburg, are represented, as are also the best masters, with Wenzel Jamnitzer at the head. The goblets, drinking-cups, and bowls reflect the German domesticity and

2308 232

2310 23

2314 232

	A
Sociability. The originals were in most cases presented by the citizens to the municipal Treasury or placed by them in the Guild-Halls of the old towns; later specimens show the magnificence of the Princely Castles with their wonderful plate. Some specimens of older ecclesiastical utensils are added. The reproductions, which have been absolutely faithfully made by dint of arduous labour were executed by the following German firms	Leopold Eberth * München * Jewellery in gold and silver, precious metals and stones, from designs by Max Pfeiffer. See grp. 30 p. 438. Emmy von Egldy * München * Jewellery. See grp. 14 and 30 p. 401 and 438. Theodor Fahrner * Pforzheim * Manufactory of gold and silver ware. Speciality: artistic jewellery from original designs by leading artists. See grp. 37 p. 446.
following German firms. C.A. Beumers, Goldsmith * Düsseldorf. Galvanoplastische Kunstanstalt * Geislingen-Steige. Grösste deutsche Anstalt für galvanoplastische Erzeugnisse. Theodor Heiden, Bavarian court-goldsmith * München.	Couis Fiessler & Cle. * Pforzheim * Manufactory of gold wares and chains, wholesale. Prize medals awarded: Paris, Antwerp, Chicago. Patents and trademarks. Trade at home and abroad. Gebr. Friedländer, Hofjuweliere Seiner
Sy & Wagner, Cour-goldsmiths to His Majesty the Emperor * Berlin, Werder-strasse 7. D. Vollgold & Sohn, Court-goldsmiths te His Majesty the Emperor * Berlin, Unter den Linden 34 * Established 1810.	Majestät des Deutschen Kaisers * Berlin W., Unter den Linden 28, * The firm has been in existence since 1829. Workshops for jewellery and silver- ware. About 200 Employees. Caskets and jewellery for presentation with portraits and Initials of His Majesty the German Emperor. Collection of German Orders. Modern jewellery. See German State Building p. 360.
Group 31. Jewelery. Exhibit of the Bernsteinindustrie. * See	Prof. G. Kleemann * Kunstgewerbe- schule, Pforzheim * Jewellery in precious metal, executed by Lauer und Wied- mann, Hans Söllner u. F. Zerenner. See
p. 401, 441, 444 and 460. Exhibit of the Edelmetallindustrie zu Hanau * See p. 400 and 438. Exhibit of the "Verein der Künstlerinnen	grp. 37 p. 446. Siegmar Lewy * Berlin S., Ritterstr. 24 * Silver-trinkets, modern jewellery. G. Werk, Kgl. Bayer. Court-jeweller, Pro-
und Kunstfreundinnen" * Berlin * See p. 399–401, 438, 441, 456, 457, 461 and 467. Exhibit of the "Vereinigte Werkstätten	in gold and silver with brilliants, pearls and precious stones. See advertisements p. 12.
für Kunst im Handwerk, G. m. b. H." * München * See p. 400, 401, 438, 441, 448, 459 and 465. Emil Binder, Bijouteriefabrik * Pforz-	Max Pfeiffer, Artist and Sculptor * München * Jewellery in precious metal with stones. (Executed by Leopold Eberth, München). See grp. 37 p. 447.
heim * Souvenirs with enamel decoration; modern trimming in silver. See grp. 30 p. 438. Advertisement p. 21. Wilh. Birmelin, Bijouteriefabrik (Vertreter Gebr. Schiff) * Pforzheim *	Joseph E. Schneckendorf, Atelier für kunstgewerblichen Schmuck * München * Jewellery in oxydised silver and silver gilt. See grp. 37 p. 447. Eduard Schöpflich, Kunstgewerbliche
	Werkstätte für modernen Schmuck *
Enamel jewellery in modern style from designs by German artists. See grp. 30 p. 438. W. Lucas von Cranach * Berlin * Kur-	München * Jewellery in gold and silver. Friedrich Speidel * Pforzheim * Established 1868. Speciality: plated chains
designs by German artists. See grp. 30 p. 438.	München * Jewellery in gold and silver. Friedrich Speidel * Pforzheim * Esta-

Group 32. Watch and Clock ma	tuttgart 1881 and 1896, Paris 1900, nd Athens 1903. Silver medal: London 190. See grp. 37 p. 455.
E xhibit of the B ernsteinindu p. 401, 440, 444 and 460.	ebr. Meister * Berlin, Brandenburg- 23.
F. 401, 440, 444 and 400. Exhibit of the Vereinigte U für Kunst im Handwerk, (rasse 42 * Large clock with regulating onnections with independant clocks of ame or different construction, size and
* München * See p. 400, 401	uality. Station clock regulated electric-
448, 459 and 465.	ly from the same. (Transport Building.)
Arndt & Marcus * Berlin, El	Prächtel, Court master joiner * Berlin, 233
29 * Clock inlaid with metal	rausenstr.31/32 * Standing clocks. See
See grps. 33 and 37 p. 442 :	ps. 37—39 and 42—44 p. 449, 454,
Math.Bäuerle,Uhrenfabrik *!	55, 458, 460, 462 and 463.
Bad.Schwarzwald*Founded	F. Rochlitz * Berlin, Brandenburg- 23:
and wall clocks of every kind workmanship only, from the the most complicated. Spe	rasse 55 * Works of the tower clock the German State Building, church ocks, school clocks, railway, factory,
kinds of work for the Engli sixteen varieties of standing	ablic building clocks. Signals for arine and fire brigade. See p. 372.
case, and eight of bracket chi &c. Over 100 hands at preser to every country. Several at	cof.O.Rohloff, (Detal chaser * Berlin * 23; ancy clock. See p.361 and grp.33 p.443.
being Paris 1900 gold med	idwig Schäfer, Möbelfabrik * Mainz * 23:
of Liberal Arts.)	mepiece with facetted crystal glasses,
C. A. Beumers, Goldsmith *	poussé dial and tarsias. See grps.
* Clock, dial and panels. So	7–39, 41, 43 and 44 p. 452, 453, 459,
and 37 p. 438 and 448.	30 and 463.
Eduard Frei, Kunsttischlere	Group 33.
stadt * Timepiece with hamn dial from designs by Prof. J. See grps. 33, 37, 38 and	roductions in Marble, Bronze, ast and Wrought Iron. See p. 434.
453, 458 and 462.	thibit of the "Verein d. Künstlerinnen u. 23;
Cheodor Holländer & Co., Kur	ınstfreundinnen"*Berlin*Seep.399—
Werkstätten * München * M	D1, 438, 440, 456, 457, 461 and 467.
See grp. 33 p. 442.	Khibit of the Ver.Werkstätten für Kunst
Georg Karp, Hofuhrmacher *	1 Handwerk, G.m.b.H. * (Dünchen * See
* Timepiece. See grp. 37 p. 4!	400, 401, 438, 440, 448, 459 and 465.
H <mark>ugo Kaufmann *</mark> München † clock "Die Zeit." See grps p. 400, 436 and 447.	anz X. Abt * Mindelheim (Bayern) * 233 upfer-Kunsttreibanstalt. Diploma Lyon 01. Gold medal and cross of honour.
Geo Kühl & Co. * Chicago, 1780	all placque of repoussé copper. Ham-
Street * Importer of cuck	ered work in one piece.
clocks and wood carvings	rtiengesellschaft vorm. H. Gladenbeck 234
Black Forest. (Palace of Lit	Sohn, Bildgiesserei * Berlin S., Ritter-
A. Lange & Söhne, Deutsche (rasse 24 * Bronze figures. Artistic ob-
kation * Glashütte, Sachsen	cts of use. Monument casting for me-
1845. Cwenty-eight first pr	orials and architecture. See German
keeping watches, ships chr	tate Building p. 359.
measuring instruments and	Ktiengesellschaft vorm. H. Gladenbeck 234
Friedr. (Da <mark>u</mark> the, G. m. b.)	Sohn, Abteilung E. Lewy-Söhne * Berlin
f <mark>abriken *</mark> Schwenningen a.N	, Ritterstr. 24 * Fancy articles, of metal
wald * House clock in modern	mbined with glass, porcelain, onyx,
work, striking four tones at th Four small standing clocks, c	one, &c. Representatives Rachmann
eight days, 1,200 workmen. of German or American clo	atiengesellschaft Lauchhammer * 234 (uchhammer (Prov. Sachsen) * Bronze
Branches at Bregenz (Austr	st of a model for a "Steuben" mo-
60, Rue de Bondy; Allensba	ument, and of a fountain figure "Even-
Medal: Chicago 1893. Gol	g." See German State Building p. 362.

2343	Gebrüder Armbrüster, Decorative smith * Frankfurt a. (1). * Eagle in wrought bronze, and repoussé metal work.	business in Germany. Prussian silver State medal since 1883. Whole museums furnished, archæologically or artistic-	
2344	Arndt & Warcus * Berlin, Elisabeth- ufer 29 * Figures, clocks, accessories for writing desks and smokers' tables, elec- tric light fittings, flower stands, mounted glass and faience, &c., in solid bronze.	ally. Collections for universities, colleges, academies, drawing schools, &c. Best source for art bargains and amateurs. (Palace of Liberal Arts and German State Building.) See p. 360 and 361.	
2345	See grps. 32 and 37 p. 441 and 454. Louis Busch, Bronzewarenfabrik * Mainz * Lustres * See grps. 37 and 41 p. 452 and 460.	Gladenbecks Bronzegiesserei, Inhaber Hermann, Alfred und Walter Gladenbeck * Friedrichshagen bei Berlin * Stands for the flagstaffs on the German	2359
2346	Fridolin Dietsche * Karlsruhe * Two wall fountain in wrought copper and marble. See grps. 11 and 37 p. 400, 445, 447 and 453.	State Building. See p. 362. J. Goldschmidt, Metall- und Zinnwaren- fabrik * Mürnberg * Metal work for use or ornamentation, wrought copper.	2360
2347	Fred. Dunn & Co. * (Dünchen * Bronzes: inkstands, candlesticks. See grps. 31 and 37 p. 440 and 447.	(Liberal Arts Palace.) F. van Hauten Sohn * Bonn a. Rh. * (Detallwarenfabrik u. Glaswarenfabrik,	2361
2348	Nelly von Eichler * Eurasburg bei München * Bronze candlestick with two figures. See grp. 11 p. 400.	Works for metal and glass articles for use or ornament, in metal only, in metal mounted glass, in coloured enamelled glass with covering and translucent	
2349	Walter Elkan * Berlin, Dessauer Strasse 6 * Articles in wrought copper covered with red patina, in metal setting. Speciality: metal colouring. See grps.33 and 37 p. 436 and 450.	enamels, faience mounted in metal, vases, flower stands, pots, table services, trays, bowls, bread baskets, cake tins, plates, jugs, cans, wine glasses,	
2350	Erzgiesserei "Renaissance," G. m. b. H. * München * Bronze. See grp. 37 p. 448.	tumblers, beer jugs. The models, sha- pes, castings, and work, the glass de- corations and the treatment in the fur-	
2351	Ch.Fambachand Alb. Hagner, Werkstätte für kunstgewerbliche Arbeiten * Mainz * Ornamental vases. See grp. 37 p. 452.	nace are all made in the factory. Founded 1880. Exports to every part of the world. Agencies with samples on view in Ber-	
2352	Eduard Frei, Kunsttischlerei * Darmstadt * Smoking table with metal top. See grps. 32, 37, 38 and 43 p. 441, 453, 458 and 462.	lin, Paris, London, Zürich, Vienna, Bonn, and at the Leipzig "Messe." Awards for high class work Amsterdam, and Brussels, also silver medal, state me-	
2353	Oskar Fritz, Kunstschlosserei * Ber- lin W., Karlsbad 15 * Brass work. See grp. 37 p. 449.	dal, and Royal Prussian Court Diploma from Düsseldorf 1904. Trade mark for metal goods. See grp. 47 p. 465.	
2354	H. Frost & Söhne * Berlin * Fabrik für stilgerechte Beleuchtungskörper * See GermanStateBuildingp.359,361and362.	Herm. Held Nachfolger * Magdeburg * Copper wall fountains, furniture mounts. See grp. 37 p. 450.	2362
2355	Fürstl. Stolbergsches Hüttenamt * Ilsen- burg * Art objects in cast iron, from designs by Albin Willer, architect,	R. Hermann, Art locksmith * Berlin * Wrought iron railing to the hind façade of the German State Building. See p. 362.	2362
2356	Magdeburg. See grp. 37 p. 450. Prof. A. Gaul, Sculptor * Wilmersdorf bei Berlin * Design of bronze eagle for	Victor Hillmer, Kunstschlosserel * Berlin, Belle-Alliance-Str. 95 * Mountings and other met.work. Bronze. See grp. 37p. 456.	2363
2357	Armbrüster Bros. of Frankfurt a. (1). Georg Gehlert, Kupferschmiede and Verzinnerei * Kiel, Papenkamp 11 *	Theodor Hollander & Co. * (Dünchen * Wrought copper and brass. Articles for use and ornament, metal clocks.	2364
2358	Wrought copper work. Deutsche Zentralstelle für klassische Skulpturen, Statuen, Büsten, Reliefs der Antike, des Mittelalters und der Neuzeit, Kunstanstalt August Gerber * Cöln a. Rh. * Original casts and reductions,	See grp. 32 p. 441. Eduard Hueck * Lüdenscheid * Artistic metal goods in pure tin and bronze-copper. Kitchen and Table forks and spoons in nickle, German silver and aluminium. See grp. 37 p. 450 and 453.	2365
	white or covered with patina according to the original to resemble old marble, bronze, ivory or wood carving. Largest	Martin Jacobi, Fabrik moderner Be- leuchtungskörper * Berlin W., Luitpold- str. 17 * Light fittings. Seegrp. 37 p. 455.	2366

2367	R. Kallenberg & Co. * Dünchen * Wrought iron and brass work from designs by Dunich artists. Articles of use and ornament. Gas and electric light fittings. See grp. 37 p. 448.	firm delivers the following high class goods: wrought copper and bronze figures, chimney pieces, facades, reliefs, and wrought and chisled work in every kind of metal. See grp. 37 p. 457.	
2368	Reinhold Kirsch, Court decorative smith * Wünchen * Antique gothic clock in iron. Specialities: lustres, lanterns, chimney pieces, doors, gates, &c.	S. A. Loevy * Berlin, Gartenstr. 96 * Hood in metal for open fire-place and silver plated furniture mountings, wrought tea-tray. See grp. 37 p. 454.	2378
2369	G. Knodt, Wetallwarenfabrik * Frankfurt a. W. * Figures and groups in copper and bronze from models of any	Jul. Müller-Salem, Teacher at the Art Industrial School * Pforzheim * Metal work. See grps. 14 and 37 p. 402 and 446.	2379
	size. Two groups for fountains, model by O.Stichling. Teuton, warriors, model by Rud. Begas. Eagle, model by Joh. Böse. Candelabra from design by Br.	Reiss, Neumann & Gansereit * Berlin, Ritterstr. 49 * Articles for lighting. See grp. 37 p. 451.	2380
	Schmitz. See German State Building p. 362.	Ph. Reitmayer, Chaser * Mainz * Wrought metal work. Chimney piece fittings. See grp. 37 p. 452 and 453.	2381
2370	Koenlg & Lengsfeld * Köln-Lindenthal * Studios for marble sculpture, art terra- cotta and galvanised bronze. Models by leading artists. Speciality: figures for electric lighting, vases, groups, &c., for room decoration, tomb-stones and monuments. Branches and agen- cies in Paris, Cöln, Berlin, Hamburg,	O. Rohloff, Professor at the Royal Industrial Art Museum * Berlin * Gold plated clock, property of His Majesty Emperor Wilhelm II.; chimney piece fittings, and fittings for writing desks. See German State Building p. 361 and grp. 32 p. 441.	2382
2371	Leipzig, St. Petersburg. (Palace of Liberal Arts.)	Otto Scheer, Metal chaser * Berlin, Königgrätzer Str. 58 * Industrial art work, for the most part in metal. See	2383
2311	Friedrich Lang, Kunstschlosserel * Karlsruhe * Fittings for gas and electric light, fenders. See grp. 37 p. 446.	grp. 37 p. 451. Walter Scherf & Co., Metallwarenfabrik	2384
2372	August Laubisch * Magdeburg * Crown from design by P. Bernadelli, wrought iron with artistic glass work for electric light. See grp. 37 p. 451.	für Kleinkunst * Nürnberg * Articles for use and ornament of "Osiris" metal and genuine silver, alone or with crystal and majolica. See grp. 30 p. 439.	2725
2373	G. Leander * Berlin SO. * Bronze and silver with enamel and inlaid amber. See grp. 37 p. 454 and 455.	Jos. Schmeidl, Workshops for industrial art work in every kind of metal * München * Industrial art work, articles in tin, and ornaments.	2385
2374	Julius Lennhoff * Berlin SO. * Artistic bronzes. Light fittings, table lamps, ornamental pottery. See German State Building p. 362.	Heinrich Schmiedt * München * Wrought work. Articles for use and ornament in tin and copper.	2386
2375	Siegmar Lewy * Berlin, Ritterstr. 24 * Articles for use or ornament with gal- vanoplastic decorations, in glass, por-	A. Schmits * Düsseldorf * Workshops for wrought metal work. Wrought mountings, panels, light fittings. See grp. 37 p. 449.	2387
	celain, &c. Represented by Rachmann Bros, of Haida. See grps. 31 and 47 p. 440 and 465.	Georg Friedr. Schmitt, Kunstgewerbliche Metallwarenfabrik "Orion" * Nürn- berg * Industrial art objects in tin.	2388
2376	L. Lichtinger, Atelier für kunstgewerb- liche Wetallarbeiten * München * Ar- ticles of use and ornament in tin. See grp. 37 p. 447.	Otto Schultz, Tezettgitterwerk, Kunst- schmlede * Berlin SW., Hallesches User 36 * Founded 1886. The works are fitted out with the best German	2389
2377	Gustav Lind Nachf., Wetallbildhauerel * Berlin, Genthiner Str. 3 * In the "Court of honour:" two bronze flower stands filled out with wrought figures, two large lions heads in bronze. Hygienic bath: Pillars and gates in bronze. The	and American machinery. Electric, compressed air, and gas power-engines. Mechanical stamping, pressing, and hammering machines. Special productions: artistic forge work in iron and bronze. Wholesale manufacture of	-

	IIIDAGERIFIE	rrobacco	
	"Tezett" railings and balustrades, pro- tected by patent in Germany as well as	Group 36.	
	in America and other foreign countries. The firm supplied 350,000 kilograms of "Tezett" railings for the electric	Toys.	
	elevated railway in Berlin. Home and foreign catalogues gratis. In the "Court of honour," artistically wrought Ger-	1. Collective Exhibit of the Sonne- berg Toy-Industry.	
2390	man eagle, 8×12 meters. See advertisements p. 1 O. Stichling, Sculptor * Berlin, Kleist-	After the designs by Director Prof. Möller, arranged in the industrial school at Sonneberg. Manager: The	1
2550	strasse 3 * Design for the fountain group in wrought copper by G. Knodt,	Chamber of Commerce in Sonneberg.	
0704	Frankfurt a. M.	Julius Bähring (for masks only). Emil Bauersachs.	2402
2391	Paul Stotz, kunstgewerbliche Werk- stätte, G. m. b. H. * Stuttgart * Fittings	Geo Borgfeldt & Co.	2403
	for gas and electric light. Art bronzes.	Crämer & Héron.	2404 2405
	See grp. 37 p. 456.	Julius Dorst.	2405
2392	Prof. Kuno von Uechtritz * Berlin W.,	Cuno & Otto Dressel.	2400
	Pfalzburger Str. 3 * Model of the "Steu- ben" monument. Figure for fountain,	Wilhelm Dressel.	2408
	"Evening." See German State Building,	E. Escher jun.	2409
	p. 362.	A. Fleischmann & Crämer.	2410
2393	W. Weiss * Karlsruhe * Wrought metal	Gebrüder Fleischmann.	2411
2394	work. See grp. 37 p. 446.	J. Franz.	2412
2394	Wilhelm & Lind, Galvanoplastische An- stalt * München * Industrial art work	Carl Geyer.	2413
	in metal.	Hermann Hachmeister.	2414
2395	J. Winhart & Co. * München * Industrial	Karl Harmus jun.	2415
	art work in copper and other metals.	Robert Hartwig.	2416
	Specialities: flower stands, palm tubs, vases, bowls, jugs, tea services, wine	Hugo Heubach.	2417
1	coolers.	C. Hoffmeister.	2418
2396	Fritz Wolber, Professor at the Industrial	Heinrich Horn. Andreas König.	2419
1	Art School * Pforzheim * Metal work. See grp. 37 p. 446.	Richard Leutheuser.	2420
2397	Josef Zimmermann u. Co. * (Dünchen *	Louis Lindner & Söhne.	2421
2391	Wrought and hammered work, lighting	Hermann Lützelberger.	2422
	fittings, column casings, and chimney-	J. N. Lützelberger.	2423 2424
	-piece decorations. See grp. 37 p. 447	A. Luge & Co.	2424
	and 448.	Müller & Froebel.	2426
	Group 34.	Wilhelm Pfarr.	2427
		Philipp Samhammer & Co.	2428
	Brushes, fine leather goods, basket	F. W. Schilling.	2429
2700	work and fancy articles.	G. Schmey, Nachfolger.	2430
2398	Exhibit of the Bernsteinindustrie. See p. 401, 440, 441 and 460.	Arthur Schoenau.	2431
2399	S. Hirsch * Berlin, Ritterstr. 75 * Belts,	Georg Spindler jun. (for masks only).	2432
	clasps, buckles, satchels. (Palace of	Louis Wolf & Co.	2433
	Liberal Arts.)	Zeuch & Lausmann.	2434
2400	Georg Hulbe, Kunstgewerbl. Werkstatt		
	für Lederarbeiten * Hamburg * Fine leather goods. See grps.14 and 43 p.401	2 Single Cyhihitare	
	and 462.	2. Single Exhibitors.	
2401	Fr. und E. Seyffarth * Magdeburg *	S. F. Fischer * Oberseiffenbach (Erz-	2435
	Writing cases and leather goods from designs by Paul Lang. See grp. 37 p. 451.	gebirge) * Established 1850. Boxes of bricks, laying games, materials	
	acoigno of Laur Lang. oce gep. or p. Tol.	or oriend, myring games, materials	

for instruction and employment for Fröbel's Kindergarten. Numerous awards. See p. 388.

Hamburger & Co. * Berlin, Alexandrinenstr. 93/94, Branch in New York: 28-30 W. 4th Ave. * Elegant dolls, dressed or undressed.

F. Ad. Richter & Cle. * Rudolstadt (Thüringen) * "Anchor Blocks" and the "Libellion" (Dusical Instrument. — "Anchor Blocks" have now for over a quarter of a century been the most popular occupation for children and adults. Their educational value for children is self evident, for they train them to habits of order, cultivate their love of the beautiful and initiate them in the first principles of architecture. "Anchor Blocks" are highly praised eminent pedagoques and used in Kindergärten and elementary schools not only as toys but also as important educational factors. The Blocks are made mathematically correct and the buildings designed by architects. "Anchor Blocks" have obtained the highest awards in all civilized countries and are known all over the world. The "Libellion" is the only German steel tongued instrument with long music notes and is thus able to reproduce the longest pieces unabridged. metal transport quards the notes from wear and tear and the method of stamp. ing enables them to stand any climate. The Libellion was the only German steel tongued instrument awarded a prize at the Chicago World's Fair in 1893. lt was also awarded in Paris in 1900. The firm F. A. Richter & Cie. employs over 500 hands in Rudolstadt and has branches and works in Nuremberg, Leipsic, Konstein, Olten (Switzerland), Rotterdam, Prague, Vienna, Hietzing, St. Petersburg, New York. See grps. 21 and 38 p. 416 and 459.

Margarete Steiff * Giengenbrenz * Leading German Felt Toy Factory. Stuffed animals and jointed dolls, best kinds with and without wire frame and wheels, of Felt, Velvet, Woollen stuffs, &c. 1,000 samples after Messrs. Paul, Richard and Franz Steiff, Bros. registered designs. Show Rooms in 15 commercial towns in different parts of the world. Export 1900: 20 per cent, 1903: 50 per cent of output. 1888: 4, 1903: 400 hands. Factory rooms 8,200 sq. metres, glass and steel throughout. Own construction.

Group 37.

Decoration and fixed Furniture of Buildings and Dwellings.

2439

2440

2441

2442

2443

2443a

2444

2445

2446

Art decorations and designs in the German Section of the Art and Industry Department: General Manager: Bruno Möhring, Architect * Berlin * The following architects assisted in the work: Philipp Felde, John Martens, Otto Rahlenbeck * Berlin.

Superintendents of decorative painting: Richard Guhr and Albert Maennchen * Berlin.

Artistic arrangements Warie Kirschner, Artist * Berlin.

1. Rooms and furniture.

Ludwig Alter * Darmstadt.

(Room 44b.)

Drawing-room.

Professor Peter Behrens * Düsseldorf * Design of room, furniture and whole outfit.

Ludwig Alter, Hofmöbelfabrik * Darmstadt * Purveyor to the Imp. Russian and Grand Ducal Hessian Court. Firm of world wide renown, leading in modern interior decoration. Fabrication after original designs of the best known artists. Highest awards Darmstadt 1901, Turin 1902. Execution of all wood and carpentering work in fine woods with intarsia.

Hagener Textilfabrik vorm. Gebr. Elbers * Hagen i. W. * Wall hangings.

Alfred Altherr & W. Ortlieb * Berlin.
(Room 52.)
Dining room.

Alfred Altherr & W. Ortlieb, Architekten
* Berlin * Design of room, furniture
and entire trimmings.

W. Dittmar (Inh. Otto Lademann), Wöbelfabrik * Berlin, Molkenmarkt 6 *
Execution of room in oak, stained in

Exhibit of Baden Art Industry.

Art and commercial manager: Prof. Karl Hoffacker, Karlsruhe.

(Rooms 29 and 30.)

Ante-room and Reception-room of an Art Collector.

Prof. F. Dietsche * Karlsruhe * Wall fountain wrought of copper and gilt.

2438

2436

2437

two colours.

2447	H. Drinneberg * Karlsruhe * Glass windows. Art stained.	Prof. H. Billing * Karlsruhe.	
2448	Ch. Fahrner, Jeweller * Pforzheim * Ornaments.	(Room 39.) Music Hall.	
2449	Otto Feist, Sculptor * Karlsruhe * Bronze statuettes, bronze bust, ink-stand.	Prof. Hermann Billing * Karlsruhe * Design of the room, furniture and entire fittings.	24
450	A. Gehrig Wwe., Hofmöbelfabrik * Karlsruhe * Panelling and furniture.	Hermann Binz, Sculptor * Karlsruhe * Bronze statuette: Girl praying.	24
451	Prof. A. Groh, Artist * Karlsruhe * Wall pictures.	Hans Drinneberg, Glass painter * Karlsruhe * Glass window, art stained, designed by Walter, Artist.	24
452	Grossherzogliche Majolikamanufaktur * Karlsruhe * Flag stone pictures after cartoons by Prof. Thoma, majolicas after	Prof. A. Groh, Artist * Karlsruhe * Decorative painting. Rudolf Ibach Sohn, Court purveyor *	24
453	designs by Mr. Süs, Artist. Prof. Georg Kleemann, Teacher at the	Barmen * Grand piano with rich case. Friedrich Lang, Art smith * Karls.	2
454	Art Industry School * Pforzheim * Ornaments. Prof. C. Kornhas, Teacher at the Art In-	ruhe * Forged lamps and upright clock. Erna Lundbeck * Karlsruhe * Silk	2
13-1	dustry School * Karlsruhe * Fire places of glazed clay. Faience.	sofa cushion, linen cover litho- graphy.	
55	Kunststickereischule des badischen Frauenvereins * Karlsruhe * Carpet	Einoleumfabrik Maximiliansau a. Rh. * Floor coverings.	2
-	for floor, designed by Prof. Gagel, Carpet forwall, designed by Prof. Thoma, needle work cushion, curtain.	J. L. Peter, Hofmöbelfabrik * Mann- heim * Panelling of the room, furniture.	2
156	Friedrich Lang, Kunstschlosserei * Karls- ruhe * Lighting sittings, senders.	M. Welte & Söhne, Orgel- u. Orchestrion- fabrik * Freiburg i. Br. * Orchestrion and organ case.	24
157	Robert Macco * Heidelberg * Intarsia factory. Interior decorations, marqueterie		
	for furniture, pianos, panelling, &c., panelling and furniture, small boxes	Prof. Max Läuger * Karlsruhe. (Room 20.)	
£58	and clocks, inlaid with wood. Prof. Rudolf Mayer, Chaser, Teacher	Sitting Room.	
459	at the Art Industry School * Karlsruhe * Plaquettes. Medal minting by B. H. Mayer, Pforzheim. Jul. Müller-Salem, Teacher at the Art	Prof. Max Läuger * Karlsruhe * Studios for interior decoration. Design of the room, furniture and entire outfit. See further exhibits by Prof. Läuger in the Ceramic Department and Mo-	24
	Industry School * Pforzheim * Orna-	del City.	
60	ments, casket wrought in iron. Offenburger Glasmosaikwerke G. m. b. H. * Offenburg * Glass mosaic fil-	Adolf Dietler, Hofmöbelfabrik * Freiburg i. B. * Panelling of walls and furniture.	24
61	lings, mosaic wall panelling. Prof. Ad. Schmid, Ziseleur, Teacher at	Prof. L. Dill * Karlsruhe * Wall paintings.	24
	the Art Industry School * Pforz- heim * Plaquettes, inkstand, orna- ments.	Karlsruher Marmor-, Granit- und Sye- nitwerke Rupp & Moeller * Karlsruhe * Marble fountain.	24
62	Eduard Scholl Nachfolger, Court book- binder * Karlsruhe und Durlach * Bindings in leather mosaic and hand	Emma Läuger * Lörrach i. B. * Manufacture of tapestry and embroidered cushions.	24
63	gilt. W. Weiss, Coppersmith * Karlsruhe * Mantlepiece.	Conwerke Kandern * Kandern * Flag stone walls, Faience fire places and pottery.	24
64	Fritz Wolber, Professor at the Art Industry School * Pforzheim * Bronze	W. Weiss, Coppersmith * Karlsruhe	24

	(Room 19.) Ante-room.	J. von Heckel, Hofblumenfabrik * München * Artificial flowers and bushes.	2497
2482	Prof. F. Dietsche * Karlsruhe * Wall- -fountain in marble.	Josef Hinterseher, Sculptor * München * Bronze figures.	2498
2483	H. Drinneberg * Karlsruhe * Glass- -window, art-stained.	Hugo Kaufmann, Sculptor * München * "Bronze upright clock."	2499
2484	F. Gerstenhauer, Joiner * Karlsruhe * Garden-benches.	Karl Kiefer, Sculptor * München * Bronze: "A dog."	2500
2485	Grossherzogliche Majolikamanufaktur * Karlsruhe * 2 Wall-pictures near the passages.	L. Lichtinger, Atelier für kunstgewerb- liche Metallarbeiten * München * Ob- jects of comfort and use in tin.	2501
2486	Max Läuger * Karlsruhe * Artist and architect, Professor at the Tech-	Georg Mattes, Sculptor * Nürnberg * Bronze: "Playing at ball."	2502
21.07	nical High-School * Art-potteries, foun- tains, &c.	Prof. Friedrich von Miller * München * Jonas cup, cup of honour, silver figure.	2503
2487	E. Schmidt-Pecht * Konstanz * Faiencevase.	Hans Obermayer, Blumenfabrik * München * Artificial flowers and textures.	2504
		Max Pfeiffer, Artist * München * Silver ornaments.	2505
	Exhibit of Bavarian Art-Industry. Art- and Business-Manager: Prof. Martin Dülfer, München.	Gebr. Pfister, Kgl. Bayerische Hofmar- morindustrie * (Dünchen * Pillars, fire places, panellings of Bavarian Jura marble inlaid with onyx, marble floor- ings	2506
,		ings. J. J. Scharvogel, Kunstkeramiker *	2507
	Prof. Martin Dülfer * München. (Room 15 and Front-court 16.) State-room.	München * Art ceramics. Josef E. Schneckendorf, Atelier für kunstgewerblichen Schmuck * München * Jewellery in oxidized and silver gilt.	2508
	(The decorations are used in the Land- rats-hall of Oberfranken at Bayreuth.)	Rudolf Schwarz, Sculptor * München * Bronze: "Paper weight."	2509
2488	Prof. Martin Dülfer, Architect * München * Design of the room, furniture and artistic fittings.	Steinicken & Lohr, Kunstgewerbliche Werkstätten * München * Bowls, vases, flowerstands, candlesticks, inkstands, &c. for writing table.	2510
2489	Eduard Beyrer, Sculptor * München * Bronze: "Madonna."	Süddeutsche Lüsterfabrik * München * 5 Lustres.	2511
2490	Boswau & Knauer, G.m.b.H. * Berlin * Stucco-ceiling and Terrazzo-floor.	Karl Winterhalter, Kgl. Bayerischer Hof- goldschmied * München * Silver epergne	2512
2491	Sophie Burger-Hartmann, Sculptor * Basel * Various pieces of bronze.	rrom the household of H.R.H. Prince Rupprecht of Bavaria.	
2492	Fritz Christ, Sculptor * München * Pieces of bronze: "Sin," "Pearl" and 2 plaquettes.	Eduard Wollenweber, Kgl. Bayerischer Hofsilberarbeiter * München * Inkstand "Locomotive."	2513
2493	Fred Dunn & Co., Atelier und Werkstätten für kunstgewerbliche Metallarbeiten * München * Ornamental bronze, inkstands, candlesticks, &c.	Josef Zimmermann & Co., Anstalt für kunstgewerbliche Metallarbeiten * München * Teapot, bronze decorations for pillars and fire places.	2514
2494	J.A. Eysser, Hofmöbelfabrik * Bayreuth * Outfit of the room and furniture.	Front-court.	
2495	Theodor von Gosen, Sculptor * München * Bronze: "Violin-player" and "Bathing."	Josef Hinterseher, Bildhauer * München * Bronze: "Figure with roe drinking." Bayerische Kunststeinwerke des Würt-	2515 2516
2496	Prof. Wilhelm Hahn, Sculptor * München * Bronze: "Adam and Eve."	tembergischen Portlandzementwerkes * Lauffen a. Neckar * Works at Lauffen	2310

	INDUSTRIAL	PRODUCTS	
	and München. Studios for sculptors at München. Cutting and sculpturing done in artificial stone.	Richard Riemerschmid * München. (Raum 13.)	
2517	Marienberger Mosaikplattenfabrik, G. m. b. H. * Marienberg i. S. * Plate	Directors' Room of Industry School at Nürnberg.	
	Coverings.	Richard Riemerschmid, Artist and architect * Pasing b. München * Design of the room, furniture and entire fittings.	2529
	Niemeyer & Bertsch. (Room 17.)	B. Kohlbecker & Sohn, Möbelfabrik * München * Fittings of the room and making of the furniture.	2530
2518	Reading Room. Adelbert Niemeyer & Karl Bertsch * (München * Design of the room, fur-	Prof. (D. Läuger * Karlsruhe * Art Ceramics.	2531
2519	niture and entire fittings. Werkstätten für Wohnungseinrichtun-	Linoleumwerke"Hansa" * Delmenhorst * Linoleum flooring.	2532
	gen * München * Execution of all wood, joining, &c. work.	Prof. B. Pankok * Stuttgart * Silk woven cushion.	2533
	Bruno Paul * München.		
	(Room 33.)	Prof. Peter Behrens * Düsseldorf.	
	Presidents' Study for the	(Room 6.)	
520	Government House at Bayreuth. Bruno Paul, Architect * München *	Reading Room of Town Library at Düsseldorf.	
2521	Design of the room, furniture and entire fittings. Crzgiesserei "Renaissance" * (Dünchen * Boys head (antique).	Professor Peter Behrens, Architect * Düsseldorf * Design of the room, fur- niture, wall decorations and entire	2534
2522	J. J. Scharvogel, Art Ceramist * Mün- chen * Ceramics.	outfit. Frau Lilli Behrens * Düsseldorf * Co-	2535
2523	Vereinigte Werkstätten für Kunst im Handwerk * München * Outfit of room, and furniture.	loured paper for bindings. C. A. Beumers, Goldsmith * Düsseldorf * Face and enamelling of the clock.	2536
	Gebrüder Rank * München.	Rudolf Bosselt, Sculptor, Teacher at the Kunstgewerbeschule * Düsseldorf * Plastics in wood and marble.	2537
	(Room 34.)	J. Buyten & Söhne, Möbelfabrik *	2538
	Presidents' Reception room	Düsseldorf * Ceilings, panellings and furniture.	
	for the Government House at Bayreuth.	Deuss & Oetker * Crefeld * Stuff for window curtains.	2539
2524	Gebrüder Rank, Architects * München * Design of the room, furniture and entire fittings.	F. H. Chmcke, Artist * Düsseldorf * Designs for the coats of arms.	2540
2525	(D. Ballin, Hofmöbelfabrik * (Dünchen * Established 1863. Interior decoration of the room.	Frau T. Frauberger und Fräulein Irene Frauberger * Düsseldorf * Wall carpets in application embroidery and coats of arms in relief embroidery.	2541
2526	Fritz Christ, Sculptor * München * Bronze "Salome," "Temptation."	Harzheim & Hagen * Düsseldorf-Rath * (Darble work in the niche with the clock,	2542
2527	R. Kallenberg & Co. * Wünchen * Ilu- mination sign boards.	group of figures.	2547
2528	Josef Zimmermann & Co., Anstalt für kunstgewerbliche Wetallarbeiten * Wün-	Kgl. Färbereischule * Krefeld * Light- proof dying of the curtains.	2543

	INDUSTRIAL PRODUCTS				
2545	A. Schmits * Düsseldorf * Furniture mounts and lamps, copper vessels.	Dresdener Werkstätten für Handwerks- kunst, C. Schmidt * Dresden * Complete outfit of furniture, execution of the	2556		
2546	Hendrick & Carl Schultze * Düsseldorf * Leather covering and hand gilt of the furniture.	wood and joining work. Gebr. Liebert * Dresden * Wall mosaics, designed by J. Goller.	2557		
	Arthur Biberfeld * Berlin.	Udlust & Hartmann * Dresden * Vi- trines and study furniture for public building (Ante-room).	2558		
2547	(Room 51.) Room for Young Lady. Arthur Biberfeld, Architect * Berlin *	Villeroy & Boch * Dresden * Majolicas to place over doors, lighting fittings, clock dials, moulded by Prof. Karl Gross and Schaale, sculptor.	2559		
	Studio for Art in houses and dwellings.	Werkstätten für deutschen Hausrat * Dresden * Various pieces of furniture, designed by Frl. Kleinhempel and Frl.	2560		
	P. Ecke, Schmidt & Cie. * München. (Room 56.)	Junge. Wurzener Teppich- und Veloursfabriken * Wurzen * Carpets.	2561		
2548	Bedroom of the "Biedermeier" age. Designed by P. Ecke, Executed by Schmidt & Cie. * (Dünchen.	A. Berger, Jeweller * Dresden * Silver inkstand with enamel trimmings, enamelled penholder for the Council, de-	2562		
	Scimilat & Cle. * Chanchen.	signed and moulded by Erich Klein- hempel.			
	Marie Kirschner & Berlin. (Room 53.)	Court bookbinder Oesterreich and Je- weller Berger * Dresden * Golden Book of the Town, cover with allegoric figure in mosaic of precious stones,	2563		
2549	Lady's drawing room. Marie Kirschner, Artist * Berlin W. * Design for the arrangement and decorations, execution wall of the covering in painting and embroidery.	designed and painted by Prof. O. Gussmann. Hofjuwelier (Dau * Dresden * Inkstand, silver and gilt with ivory and stones, and penholder for the councellors, de-	2564		
2550	Christoph Andreä * Mülheim a. Rh. * Velvet for the wall decorations.	signed by Max Hans Kühne, architect. Pirner & Franz, Brass founder * Dres-	2565		
2551	Barmer Teppichfabrik, Vorwerk & Co. * Barmen * Carpets.	den * Ballot urn for the city council in silver and bronze, designed by Prof. Schumacher.			
2552 2553	Oskar Fritz, Kunstschlosserei * Ber- lin W. * Brass work. C. Prächtel, Court joiner * Berlin *	Juwelier Wilde * Dresden * Hammer and bell for the council in silver and ivory, designed and modelled by Ger-	2566		
2333	Seats.	trud Kleinhempel. Juwelier Bertrand * Dresden * Hammer and bell for the councellors, in copper	2567		
	Prof. W. Kreis * Dresden. (Room 36 and 37.)	and silver with intarsia, designed by Margarete Junge.			
	Stateroom for the "Ständehaus" at Dresden and Ante-room.	W. Kümmel * Berlin.			
2554	Prof. W. Kreis, Architect * Dresden * Design of the room, furniture and entire fittings, if not specially mentioned elsewhere.	(Room 47.) W. Kümmel, Möbelfabrik * State cabin with adjoining bathroom for S.S. "Prinz Eitel Friedrich" of the "Norddeutscher fleud Bromen". Designed by Trita	2568		
2555	Frl. A. Angermann * Dresden * Wall applications, designed by Prof. Otto Gussmann.	Lloyd, Bremen." Designed by Fritz Sauvage of Berlin, architect.			
	Prince the Control of				

	Committee for the Leipsic Exhibition.	Paul Sturm, Sculptor * Leipzig * Models for the ornamental figures of the organ-loft and book-cases and for the	2585
	(Room 35.)	bronze reliefs on the grand. Medals and plaquettes.	
	Music Room.	Prof. Artur Volkmann * Rom * Marble	2586
2569	Fritz Drechsler, Architect * Leipzig * Design and details of the room, panelling, organ loft, wardrobes, &c.	relief "Orpheus among the animals" (Original). (D. Welte & Söhne, Orgelfabrik * Frei-	2587
2570	Eduard Beyrer jun. * München * Bronze statuette "Marya Delvard." Original.	burg i. B. * Organ works. Wurzener Teppich- und Veloursfabri-	2588
2571	Julius Blüthner, Hofpianofortefabrik * Leipzig * Grand-Piano.	ken * Wurzen i. S. * Floor carpet. Hans Zeissig, Sculptor * Leipzig *	2589
2572	Carl Dürfeld *Chemnitz *Wallhangings.	Models for the figures of the movable furniture.	
2573	Walter Elkan * Berlin * Execution of bronze reliefs on grand-piano and handles on wardrobes.	Musikverleger Breitkopf & Härtel, Max	2590
2574	Prof. Hermann Hahn * München * Bronze statues "Adam," "Eve" and "Dancer." Originals.	Brockhaus, Ernst Eulenburg, Otto Forberg, Robert Forberg, F. E. C. Leuckart, C. F. Peters, J. Rieter-Bledermann und Bartholf Senff * Leipzig * Works by	
2575	Johannes Hartmann, Sculptor * Leipzig * Models for Stucco on the side of Organ. Marble bust of Robert Schu-	classical and prominent modern com- posers, and literature on Music.	
	mann (Original). Plaquette of Klinger in cast silber. Bronze statuette of Rob. Schumann the composer. (Copy of the	Group of Artists, Magdeburg.	
	Schumann monument at Zwickau i. S.)	(Room 45.)	
2576	Prof. Max Klinger * Leipzig * Marble bust of Franz Liszt and Richard Wagner (Originals).	Gentleman's Study.	2504
2577	Georg Kolbe, Sculptor and Artist * Leipzig * Marble bust of Joh. Seb. Bach (Original).	Albin Müller, Architect * Design of equipment of the room and designs of objects executed by the following firms.	2591
2578	Felix Pfeifer, Sculptor * Leipzig * Plaquettes, medals and bronze figure "Eve" (Original).	Alb. Becker, Elektrotechnische Fabrik, founded 1865 * Light installation. Bretting & Römer * Cocoanut carpet.	2592 2593
2579	Fritz Rentsch * Leipzig * Wall hangings in application and painting.	W. Dittmar * Window frames. Th. Encke, Möbel- und Parkettfabrik, be-	2594 2595
2580	Rixdorfer Linoleumfabrik * Rixdorf b. Berlin * Floor covering.	gründet 1830 * Execution of wall- panelling with wardrobe, frames of	2000
2581	Saalburger Marmorwerk Rödel & Co. * Saalburg a. S. * Marble panelling and marble pillars for busts in Saalburg marble.	entrance and niche with cupboard. Facette glasses and brass glazing W. Duchrow. Fürstlich Stolbergsches Hüttenamt *	2596
2582	Hermann Schreyer * Leipzig * Execution of Glass-paintings.	Ilsenburg * Artistic casting in iron. W. Grimpe * Side board.	2597
2583	F.A. Schütz, Kunstmöbelfabrik * Leipzig * (Art manager: Ludwig Caspar and H. Möckel.) Execution of the wood architecture (organ-loft, case panelling,	Herm. Heimster jun. * Manufacturer of art industry furniture. Execution of writing table (Patent B. Göbel, Freiberg), framework of chair and easy chair.	2598
	cases for music, and upholstery); design and execution of the grand-piano and the movable furniture.	Herm.Held Nachfl. * Mountings mounts and wall fountain. O. Henschel * Stucco-plastics with	2599 ⁾ 2600
2584	Prof. Max Seliger * Leipzig * Designs for the painted glass-windows and the	mosaics. Eduard Hueck * Lüdenscheid * Objects	2601
	carpet.	in tin and copper.	

	INDUSTRIAL	PRODUCTS	
2602 2603 2604	R.Jahn, Kunstschmled * Lighting fittings. H. Jahns * Carvings to the above objects. R. Kaiser + Carvings on the symbol of the	and soft china ware, special substance. Decor: handcarved relief, flamed gla- ings with gold veins, dead glazings,	
2605	R. Kaiser * Carvings on the cupboard. O. Killmey * Upholstering of the easy chair (registered) and the chair to writing desk.	underglazing painting, cutting process. Buckauer Porzellanmanufaktur * Dining and coffee service designed by H. and F. von Heider.	2627
2606	A. Laubisch, Kunstschmied * Casing for heating appliances.	Paul & Miller, Ofenfabrik * Fountain niceh and fire place, underglazing paint-	2628
2607	P. Meissner * Bookcase and table before sofa.	ing and stained glazings. Designed by H. and F. von Heider.	
2608	H. Näter * Framework of sofa, chair and stool.	Reps & Trinte, Kunstanstalt für plasti- sche Bildwerke * Vases and sculptures after models by H. and F. von Heider	2629
2609 2610	C. Schoppmeyer * Cupboard.	and Carl Wegener, Sculptor.	
2611	W. Schottstedt * Corner cupboard. H. Stahl * Cupboard and what-not.	Werkstätten der Kunstgewerbeschule	2630
2011	11. Stant & Cupocatu and What-not.	* Lithography (teacher: H. von Heider, printer: J. Schmidt). Book printing	
2612	Paul Lang, Artist * Designs for the followings:	(teacher: E.Nigg). Ceramics (teachers: H. and F. von Heider). Original lithographs	
2613	Benecke & Lattey * Carpets, hand made Smyrna.	and vases. Also concerned in the making of the printed matter exhibited	
2614	Walter Buhtz * Writing cases and leather articles.	as well as in the execution of fountain niche, fire places, &c.	
2615	Wilh. Duchrow, Court purveyor * Window above the divan.	A. Wohlfeldt, Buch- und Kunstdruckerei * Print of explanatory report with.	2631
2616	Paul Knüppelholz, Court purveyor *		
2617	Upholstering of the sofas and chairs.	Leo Nachtlicht * Berlin.	
2011	Frau Minna Lang-Kurz * Table centres and antimacassars.	(Room 48.)	
2618	Frl. Paula Langbein * Cushions.	Reception room.	
2619	Herm. Liebau * Wrought brass fence.	Leo Nachtlicht, DiplIng. Architekt *	2632
2620	Peter G. Palis, Inh. Ramdohr Söhne * Curtains.	Berlin * Design of the room, furniture and entire fittings.	
2621	Fr. und E. Seyfarth * Writing cases and	Josef Baranek * Berlin * Art glazings.	2633
2622	leather objects.	Else Oppler * Berlin * Embroideries.	2634
2022	Fr. Steinhäuser * Hemleben (Thüringen) * Wall hangings.	Probst & Boeker, Tischlermeister * Ber- lin * Execution of all woodwork and	2635
2623	Paul Bürck, Artist * Designs for	joinery.	
	wall carpet and chief window.	Reiss, Neumann & Gansereit * Ber- lin SO. * Lighting fittings.	2636
2624	Wilh. Goergens, Kunstanstalt für Glas-	Otto Scheer, Metallbildhauer * Berlin *	2637
	malerei, Hofglasmaler Sr. Hoheit des	Art industry work, mostly wrought in	

* Original work in lustre porcelain

Herzogs von Anhalt * Execution of the

Gebr. Mengering * Exhibit of wall

carpet, made by school of Art Weaving,

Hans und Fritz von Heider, Maler

chief window.

Scherrebek.

2625

2626

Summer residence of an Art connoisseur.

metal.

upholstering.

Art industry work, mostly wrought in

Walther Schmarje, Bildhauer * Schmar-

Reinhold Willner, Tapezier und Dekora-

teur * Berlin S. 90 * Decorations and

gendorf b. Berlin * Sculptures.

2638

2639

Professor Joseph M. Olbrich * Darmstadt.

This building, designed by Professor J. M. Olbrich, is situated in the main aisle of the German Art Industrial Section, and must be imagined as the model for a Summer residence, with park and garden surrounding it simply and effectively

laid out. To carry out the character of this Country house the rooms are so arranged, that though each has an individuality of its own, they give the impression of a harmonious whole. In the wings on either side of the fountain court lie the Baden, Wurtemburg and Alsace-Lorraine rooms, viz.: Reception room by Prof. Läuger, Karlsruhe; a hall for Ceramic Art by Prof. Hoffacker, Karlsruhe; a music room by Prof. Pankok, Stuttgart, and a large sitting room by K. Spindler, St. Leonhardt. This suite of rooms adjoins six rooms in the main body of the building. Their interiors, carried out entirely by Hessian artisans after designs by Prof. J. (D. Olbrich, consist of: A large sitting room, drawing room, library, dining room and music and smoking room forming altogether the Hessian section.

Gray	Sittin	ıg	Room.
	(Room	24	ł.)

Designed by Prof. J. M. Olbrich.

(Room 22.)

Designed by Prof. J. M. Olbrich.

Tea Room.

Exhibitors:

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2640 Ludwig Schäfer * Mainz * Furniture factory and decoration. Award Paris 1900. Wood work and furniture in oak, stained silvergray with intarsia. Wall panellings in semi-silk, handwork.

2641 J. A. Schuler * Mainz * Workshops for Art glazing. Stained glass windows.

2642 Ch. Fambach und Alb. Hagner, Workshops for Art glazing * Mainz * Decoration vessel in wrought copper, silver-plated.

Ph. Reitmayer * (Dainz * Enchaser. Workshops for metal art industry. Chimney-top wrought in copper partly nickel-plated.

2644 Grünwald und Köllner * Mainz * Marble. Stonework for the fire place.

2645 Friedrich Endner * Darmstadt * Workshop for art glazing. Small figural medal, erased and burnt.

Gustav Nitsche, Artist * Darmstadt * Painting of ceiling and walls in oriel.

Paul Haustein * Darmstadt * Member of the Künstlerkolonie. Art industry objects in vitrine.

2648 J. U. Cissarz * Darmstadt * Member of the Künstlerkolonie. Ornaments in vitrine.

2649 Frl. Riedel * Darmstadt * Embroiderer. Sofa cushion.

Robert Macco * Heidelberg * Marqueteur. Card box.

Exhibitors:

A. Bembé * (Dainz * Court furniture manufactory, joinery, fire places, mosaics, metal works.

Georg Karp, Court watchmaker * Darmstadt * Small upright clock.

Louis Busch * Mainz * Bronze ware factory. Silver plate lustre.

Frl. Appel * Darmstadt. * Teacher at the Alicenschule. Embroidery in the show wardrobe and on the furniture.

Frl. Schiffel * Darmstadt * Embroiderer. Sofa cushion.

Dining Room. (Room 25.)

Designed by Prof. J. M. Olbrich.

Exhibitors:

Ludwig Alter * Darmstadt * Court furniture manufactory, joinery and furniture.

J. L. Boysen * Darmstadt * Sculptor. Carvings on wooden parts of the Dining room.

Hubert Bringer * Darmstadt * Studio for art embroidery. Curtains.

Ph. Reitmayer * (Dainz * Enchaser. Workshop for art industry metal goods. Wrought brass work on fire place.

Delp und Karn * Mainz * Marble. Fire place decoration.

Gailsche Dampfziegelei * Giessen * Glazed tiles in the fire place.

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	Industrial	PRODUCTS	
2662	Friedr. Endner * Darmstadt * Work shop artglazing. Oval window.	Gentleman's Room. (Room 27.)	
2663	K. A. Seifert * Dresden * Bronze ware factory. Fittings for lighting.	Designed by Prof. J. M. Olbrich.	
2664	Deutsche Lincrustawerke, Pallas-Marke, Gerhard & Co. * Höchst a. Main * Lin- crusta for wall coverings in sitting rooms and on staircases.	Eduard Frei * Darmstadt * Speciality: Art joinery and furniture after designs by Prof. J. M. Olbrich, Darmstadt.	2680
2665	Eduard Hueck * Lüdenscheid * Tin ware factory. Tin ware in vitrines.	Benz & Rast * Darmstadt * Art in- dustry workshop. Large glass window.	2681
2666	Louis Noack * Darmstadt * Porcelain	J. U. Cissarz * Darmstadt * Lithographs and hand drawings.	2682
2667	and fancy ware. Glasses in vitrines. Frl. Appel, Frl. Schippel, Frl. Riedel,	Georg Karp * Darmstadt, Künstler- kolonie * Court Watch maker. Small upright clocks.	2683
	Frl. Schnittspahn, Frl. Kress. * State carpet for H. R. H. the Grand Duke of Hesse.	Deutsche Lincrustawerke, Pallas-Marke, Gerhard & Co. * Höchst a. Main * Lin- crusta for covering walls, designed by Prof. J. M. Olbrich.	2684
	Music Room.	Prof. L. Habich * Darmstadt, Künstler-	2685
	(Room 26.)	kolonie * Bronze plastics. Eckerts Nachfolger * Darmstadt * Por-	2686
	Designed by Prof. J. M. Olbrich. Exhibitors:	celain and fancy ware. Fittings for lights.	
2668	Ludwig Schäfer * (Dainz * Furniture factory. Award Paris 1903. Joinings and furniture in German peartree with leather covering.	Library. (Room 23.) Designed by Prof. J. (T). Olbrich.	
2669	J.A. Schuler, Workshops for Art glazing	Exhibitors:	
2670	* Mainz * Great window. Friedr. Endner, Workshops for Art glazing * Darmstadt * Square medal with Monogram G. L.	J. Glückert * Darmstadt * Furniture manufacturer by special appointment. Joinery and furniture. Curtains and embroideries.	2687
2671	Carl Mand * Koblenz * Court Piano maker. Fancy wall grand after Olbrich.	DeutscheLincrustawerke, Pallas-Marke, Gerhard & Co. * Höchst a. Main * Lin-	2688
2672	Ph. Reitmayer * Mainz * Enchaser, Workshop for Art industry metal work. Chimneytop in copper.	crusta for wall coverings, designed by Prof. J. (1). Olbrich. Prof. G. Schönleber * Karlsruhe * Oilpainting.	2689
2673	J. V. Cissarz * Darmstadt * Künstler- kolonie. Tempera wall paintings.	Prof. Fr. Fuhr * Karlsruhe * 2 Tempera wall pictures.	2690
2674	Paul Haustein * Darmstadt, Künstler- kolonie. Framed pictures and wall paintings on wood.	Prof. Hans v. Volkmann * Karlsruhe * Oilpainting. Gustav Kampmann, Artist * Karlsruhe	2691 2692
2675	Frl. Appel * Darmstadt * Teacher at the Alicenschule. Embroidered Curtain.	* Oilpainting. Prof. Ludwig Habich, Sculptor * Darm-	2693
2676	K. A. Seifert * Dresden * Factory for light fittings: Brass lantern.	stadt * Sculptures. J. V. Cissarz * Darmstadt, Künstler-	2694
2677	H. & J. Weber * Darmstadt * Stucco work.	kolonie * Objects in vitrine. Paul Haustein * Darmstadt * Objects	2695
2678	Robert Macco + Heidelberg + Rose.	in vitrine.	2606

Dr. Greiner * Darmstadt, Künstlerkolonie * Sculptures.

Prof. Fridolin Dietsche * Karlsruhe * Sculpture "Hans Jacob."

2696

2697

Robert Macco * Heidelberg * Rose-wood box.

Frl. Kress * Darmstadt * Embroiderer Sofa cushion.

2678

2698	Prof. Hermann Volz * Karlsruhe * Sculpture "Repentance."	Artists Club "Werkring."	
2699	Julius Bergmann * Karlsruhe * Oil- painting "Autumn Evening."	a) Prof. Alfred Grenander * Berlin. (Room 8.)	
2699a	EmilieStephan *Karlsruhe*Oilpainting.	Reception Room.	
2699b 2699c	Walter Strich-Chapell * Karlsruhe * 2 Oilpaintings. Helene Stromeyer * Karlsruhe * Oil-	Prof. Alfred Grenander, Architect * Berlin * Design of the room, furniture	2711
	painting: "Anemone."	and entire fittings. Arndt & Marcus * Berlin SO. * Clock	2712
2699d	Bertha Welte * Karlsruhe * Oilpainting.	inlaid with metal and amber.	
	C. Prächtel * Berlin.	W. Kümmel, Möbelfabrik * Berlin O. * Furniture.	2713
	(Room 55.)	G. Leander * Berlin SO. * Silver table	2714
<u> </u>	Drawing Room of 1813.	lamp inlaid with amber, silver plated lamps.	
2700	C. Prächtel, Court joiner * Berlin * Entire execution. Furniture in old mahogany with ebony veins and gilt	S.A.Loevy, Bronzegiesserel * Berlin D. * (Detal fire place, top and dogs, all the mounts, tea-tray and inkstand.	2715
2701	bronze. Karl Hozák * Neuendorf-Nowawes * Carpeting.	Marmorwerke Balduinstein, Guido Krebs * Balduinstein i. HN. * Marble fire place and pillars.	2716
		Ernît Nast * Berlin * Intarsia.	2717
	Carl Spindler * St. Leonhardt bei Börsch.	(Room 9.)	
	(Room 21.)	Sitting Room.	
	Gentleman's Room.	Prof. Alfred Grenander * Berlin * Design	2718
2702	Carl Spindler, Artist * St. Leonhardt	of the room, furniture and entire fittings.	
	b. Börsch (Unterelsass) * Design and fittings of the room, panelling and furniture with wood intarsia. Grand	A. S. Ball, Möbelfabrik * Berlin W. * Furniture.	2719
	Prix 1900.	G. Leander * Berlin SO. * Table- and	2720
2703	Charles Bastian * Strassburg i. E. * 2 Plateaus with inlaid tiles.	other lamps. Marmorwerke Balduinstein, Guido	2721
2704	Paul Braunagel und August Cammissar * Strassburg i. E. * Mosaic glass win-	Krebs * Balduinstein i. HN. * Pillars of marble of various colours.	
	dow, fire place window and screen glass filling. Gold medal Carlsruhe 1901.	Alfred Mohrbutter, Maler * Schmargendorf b. Berlin * Decorative pictures	2722
2705	Désiré Christian & Sohn * (Deisenthal in Lothringen * Art glasses, office	and fresco.	
	fittings, bowl, &c.	h) Butan Huhan / Charlettanhuna	
2706	Ph. Elchinger & Söhne * Sufflenheim	b) Anton Huber * Charlottenburg. (Room 11.)	
	i. E. * Fire place, mounting of irisated tiles, vases of hard earthen ware and	Dining Room.	
2707	art pottery.	Anton Huber, Architect, Atelier "Patriz	2723
2707	E. Koeberlé * Strassburg i. E. * Cushions and chair coverings of decoloured plush.	Huber"* Charlottenburg-Berlin* Design of the room, the furniture and entire	
2708	Marie Köchlin * Strassburg i. E. * Em-	fittings.	
2709	broidered cushions and chair coverings. Luise Spindler * St. Leonhardt * Ta-	P. Bruckmann & Söhne, Silberwaren- fabrik * Heilbronn a. N. * Clock and	2724
	pestry and wall hanging in application	epergne.	
2710	embroidery. Gebr. von Zachock, Hunstschlosserel *	Elsa Huber * Mainz * Embroidered tapestry.	2725
-110	Strassburg-Neudorf * Fittings for lights.	Mathilde Huber * Mainz * Design	2726

	INDUSTRIAL PRODUCTS		
2727	Otto Merz * Ravensburg * Curtains and wall hangings.	e) Rudolf und Fia Wille * Berlin. (Room 12.)	
2728	C. Prächtel, Hoftlschlermelster * Berlin * Furniture, Fire place and Decorations.	Boudoir.	
2729	M. H. Wilkens u. Söhne * Hemelingen * Complete silver table service: epergne, candlesticks, wine decanters, liqueur	Rudolf und Fla Wille * Berlin W. * Design of the room, furniture and entire outfit.	2743
	glasses, tray, knives, forks, spoons, &c.	Martin Jacobi, Fabrik moderner Be- leuchtungskörper * Berlin W. * Fittings for lighting.	2744
	c) Arno Körnig * Berlin. (Room 10.)	W. Kümmel, Möbelfabrik * Berlin O. * Furniture.	2745
	Nursery with small night nursery.	Royal Württemberg Central for In-	
2730	Arno Körnlg, Architect * Berlin-Wil- mersdorf * Design of the rooms, fur- niture and entire fittings.	dustry and Commerce * Stuttgart. (Room 28.) Dusic Room.	
2731	Rudolph Hertzog * Berlin C. * Entire furniture of the night nursery. See advertisements p. 31.	Prof. B. Pankok * Stuttgart * Design of the room, furniture and entire fittings.	2746
2732	C. Prächtel, Court joiner * Berlin * Entire furniture of the day nursery.	Prof. E. F. Berner * Stuttgart * Casket, inlaid, made in the Royal art industry workshop for teaching and experimenting.	2747
	d) Curt Stoeving * Berlin. (Room 7.)	G. Adolf Bredow, Sculptor * Stuttgart * Art bronze and silver ring bowls, cast by Paul Stotz, art industry workshop, Stuttgart.	2748
2733	Hall of an Art connoisseur. Curt Stoeving, Artist and Architect * Berlin * Paintings statues, selfmade	Detmolder Stuckfabrik, Alb. Lauermann * Detmold * Ceiling in "stukkolin." See advertisements p. 8.	2749
2734	small plastics. Design of the room, furniture and entire fittings. Robert Casparl * Berlin W. * Leather	Eckstein & Kahn, Leinwand- und Tisch- zeugweberei * Stuttgart * Table cloth and curtains, open work.	2750
2735	upholstering. S. A. Hesslein & Co. * Nürnberg * Stuff	Frauenarbeitsschule Heilbronn * Embroidered sofa cushion.	2751
2736	for wall hangings. G. Krüger, Bronzewarenfabrik * Berlin,	Frauenarbeitsschule Reutlingen * Embroidered sofa cushion.	2752
2777	Prinzenstr. 21 * Silverplated ornaments on the furniture.	Frauenarbeitsschule des Schwäbischen Frauenvereins * Stuttgart * Embroidered sofa cushion.	2753
2737	G. Leander * Berlin SO. * Light for the fire place and corner pillar, mantle piece.	Frauenarbeitsschule Ulm a. D. * Embroidered sofa cushion.	2754
2738	Eugenie Reinhard * Berlin * Embroldered tapestry and portières.	Germania Linoleumwerke, Bietigheim * Linoleum flooring.	2755
2739	C. C. Schirm, Atelier für Email * Grunewald near Berlin * Inlayings of enamel in wood and metal, covering of fire place and doors in enamel.	Emil Kiemlen, Bildhauer * Stuttgart * Bronze statuettes, cast by Paul Stotz, art industry workshop, Stuttgart.	2756
2740	August Simon, Stuhlfabrik * Berlin * Seats.	Gustav Kottmann, Möbelstoffweberel * Crefeld * Stuff for the upholstered furniture.	2757
2741	Schulz & Holdefleiss, Artistic black- smith * Berlin * Hammered dogs and fire irons.	Friedrich Mauthe * Schwenningen * One upright clock and 4 grandfather-clocks.	2758
2742	Wilhelm Voigt, Möbelfabrik * Berlin * Furniture in yellow, polished birch.	B. Rudolph, Carver in ivory * Stuttgart * Busts, figures and reliefs of ivory.	2759

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2760	Val. Saile, Glasmalerei und Kunstver- glasungen * Stuttgart * Window pane with art glazing.	Detmolder Stuckfabrik Alb. Lauermann * Detmold * Stucco decorations of Stoccolin, Patented (German patent 129, 440),	2773
2761	Schiedmayer, Pianofortefabrik * Stutt- gart * 1 Grand-Piano, case in old water oak, lid with marquetry and deep carv- ings; music stand.	filigree, light, greatest clearness of the ornamental forms, highest plastic effect. Artistically got up catalogues (4) and works on ceilings (3). 230 workmen. Work done: Representation room	
2762	Städtische gewerbliche Fortbildungs- schule, weibliche Abteilung * Stutt- gart * Art potteries.	of German Empire in the art industry department. Schlüter ceilings in German State Building. See p. 360 and 361.	
2763	Daniel Stocker, Sculptor * Stuttgart * Bronze statuettes, moulded by Paul Stotz, art industry workshop, Stuttgart.	See advertisements p. 8. Deutsche Stelnindustrie AktGes., vorm.	2774
2764	Paul Stotz, kunstgewerbliche Werkstätte * Stuttgart * Lustres, lighting fittings, art bronzes and ornaments.	M. L. Schleicher * Berlin NW. * Marble, Granite and Syenit works. Marble table of blue Penteli marble and metal crusting. 2 Fire places with pieces of bronze work.	
2765	Stuttgarter Möbelfabrik Georg Schöttle * Stuttgart * Special factory for xylec- tipome furniture, execution of the	See German State Building p. 359–361. Andreas Egersdörfer * Frankfurt a. M.	2775
2766	joining and furniture in dead walnut. Hermine Winkler, Werkstätte und	* Teacher at the Städel Institute of Art: Decorative painting in Food Exhibition. H. C. E. Eggers & Co. * Hamburg * Safe	2776
	Schule für Kunstweberei * Stuttgart * Door hangings, in Scherrebek style, carried out by hand. See p. 468.	and strong box builders. Iron super- structure and bridge building. Art foundry. Founded 1865. 300 Workmen.	
2766a	G. Wölfel * Stuttgart * Largest and most efficient workshop for inlaid work (marquetry, intarsia). 16 Electromotors.	Extensive Export to the Tropics. World's Fair Paris 1900: gold medal. See German State Building p. 359.	
	Last award: Paris 1900, gold medal. All inlaid work on the walls furniture and grand-piano. See German State	Elchheim, Kunstschlosser * München * Foot, hammered, for the marble tables of Brothers Pfister.	2777
	Building p. 360. See advertisements p. 10.	J.Glückert, Hofmöbelfabrik, Grossherz. Hessischer und Kaiserlich Russischer Hoflieferant * Darmstadt * Reception	2778
:	2. Single Exhibitors.	pavilion of the firm Henschel & Son,	-
2767	Exhibit of the "Verein der Künstle- rinnen und Kunstfreundinnen" *Berlin*	Cassel. Entire interior and exterior execution after designs by Karzt & Fanghänel, architects, Cassel. See Crans-	
2768	See p. 399-401, 438, 440, 441, 457, 461 and 467. Konrad Astfalck * Wilmersdorf b. Berlin	portation Building. Carl Grätz, Artist * Frankfurt a. (1). * Decoration wall painting in the exhibition	2779
2100	* Copies of series of "Kurfürsten" carpets, painted on gobelin linen. See German State Building p. 360.	for Food Supply. Richard Guhr, Artist * Berlin * Sigmundshof 11 * Decorative fresco in the	2780
2769	Carl Baldes * Frankfurt a. (1). * Statues and stucco ornaments in the Food	amber department. Ceiling paintings in German State Building. See p. 360 and grp. 37 p. 445.	
2770	Exhibition. Ernst Baumgart * Südende bei Berlin * Marblework for mud bath installation ob the Kgl. Preuss. Domänenverwal- tung. [Palace of Liberal Arts.]	Viktor Hillmer, Kunstschlosserei * Ber- lin SW. 29 * Decorated bronze pillar, balustrade and railings. See grp. 33 p. 442.	2781
2771	Prof. Christian Behrens * Breslau * Allegorical figures and groups, deco- rative plastics. See German State Building p. 359, 361 and 362.	G. Jörissen, Marmorbruch Auberg und Wirbelau * Oberlahnstein * Door framings and wall coverings of polished Nassau marble, designed by Bruno	2782
2772	ChemTechn. Fabrik. Dr. Alb. R. W. Brand & Co., G. m. b. H. * Charlottenburg * Chemically stained marble plates in the	Möhring, architect (vestibule). Sold in U.S. A. by Marble Quarrying and Importing Co., New York City and Al-	

2783	L. Kayser, Tischierel * Berlin, Kreuz- bergstr. 30 * Art joinery. See German	Great and his sister as children." See German State Building p. 359.	
2784	State building p. 359 to 362. The marno Keiiner & Charlottenburg-Berlin & Studio for sacred and secular paintings. Ceiling paintings and decorations of the Brandenburg Chamber, also the other paintings in the German State building. Award: the Prussian silver	Robert Schirmer, Biidhauerateiler * Beriin, Schaperstr. 32 * Ornamentai and figurai decoration and execution of the ceramic haii and its façades. Mo- dels for ornamental stone carving. See grp. 11 p. 400. See advertisements p. 30.	2799
278 5	State medal at the first German Bau- aussteliung (Exhibition for architecture), many testimonials. See p. 359, 361. Kimbel & Friederichsen * Berlin, York- strasse 43 * Fittings of Gentleman's study and ante-room. See German State building p. 359, 360 and grps. 38 and	Arthur Schuiz, Bildhauer, u. Frau Martha Schuiz * Beriin, Fasanenstr. 33 * Portrait busts of H. M. Emperor Wiliiam II. in hunting uniform, and Prince Henry of Prussia. Piastics and decorations in the exhibition of the Royal Ministry of agricuiture, forestry and domains.	2800
2786	43 p. 458, 462. Prof. Max Koch, Lehrer am Kgi. Kunst- gewerbemuseum Berlin * Potsdam * Paintingsfordecoration of reading-room of German State Building. See p. 360.	Helene Schuiz * Beriin, Fasanenstr. 33 * Portraits and decorative filling pict- ures. See German State Building p. 360, 361.	2801
2787	Hermann Krause, Kunstschmiede und Schiosserei * Berlin, Thurmstr. 68 * Wrought ornaments and railings, made by machinery.	Schuiz & Hoidefleiss, Kunstschmiede- werkstatt * Beriin, Fennstr. 13 * Bronze railing in the chief staircase. See German State Building p. 360 and grp.	2802
2788	Franz Krüger, Sculptor * Frankfurt a. (D. * 4 German costume figures in the Food exhibition.	41 p. 460. L. Sobotta * Beriin, Hailesches Ufer 23 * Decorative paintings.	2803
27892790	C. A. Lang * Kelheim a. d. D. * Execution in Keiheim iimestone. Special quarrying. Exhibit: Table of Keiheim iimestone. See German State Building p. 359. Gustav Lind Nachf., (Detailbildhauerei	August Unger, Artist and Designer * Beriin, Bernburger Str. 21 * Ceiling paintings in the German State Building and decorative paintings in the German	2804
	* Berlin, Genthiner Str. 3 * Bronze piliars and bronze railings in the Bath exhibition. See grp. 33 p. 443.	wine restaurant. See p. 361 and 362. Vereinigte Württembergische Werkstätten für Kunst im Handwerk * Stuttgart * Paintings on the safe of	2805
2791	Aibert Maennchen * Beriin, Dörnberg- strasse 7 * Painting for the portal, paint- ed wall hangings for the hali for ceramics.	J. Ostertag, Aalen. Hermann Verwiebe, Artist * Pankow * Portrait of the Great Elector and his	2805a
2792	Theodor Martin, Architect * Frankfurt a. M. * Plan of Food supply exhibition.	consort Princess Louise Henriette. See German State Building p. 361.	
27932794	Opderbecke & Neese * Düsseldorf * Marble postaments in Penteii marble. See German State Building p. 361. Gebr. Pfister, Kgl. Bayer. Hofmarmor-	Emii Ziegier, Artist * Frankfurt a. (1). * Decorative painting, rough painting and gilding, and sign boards in the Food Supply Exhibition.	28056
	industrie * München * Marble tabies, plates of Lindenhöhe marbie.	Group 38.	
2795	Georg Riegei, Kunstmaier * Nürnberg * Painting "The Nürnberg Hopmarket" in the Food Exhibition.	Office and Household furniture. Exhibit of the "Verein der Künstierinnen	2806
2796	Max Rossbach, Kunstmaier * Soiin- München * Decorative wall paintings for the reading-room. See German State Building p. 360.	und Kunstfreundinnen" * Beriin * See p. 399 to 401, 438, 440, 441, 456, 461 and 467. Ludwig Aiter, Hofmöbeifabrik * Darm-	2807
2797	Joseph Rummelspacher, Artist* Beriin, Anhaitstr. 14 * Decorative painting in the Aipine Undertaking "The German	stadt * Drawing room fittings vitrines, tables. See grps. 37 and 43 p. 445, 452 and 461.	
2798	Tyrolese Aips." See p. 506. Philipp Otto Schäfer, Artist * München Copy of Pesne's painting "Frederick the	A. S. Bail, Möbeifabrik * Berlin W., Potsdamer Str. 27a * Furniture, sofas, tabies, &c. See grp. 37 p. 454.	2808

2809	(D. Ballin, Hofmöbelfabrik * (Dünchen * Founded 1863. Factory and studios for artistic interior architecture. Under-	A. Gehrig Wwe., Hofmöbelfabrik * Karlsruhe * Side boards, sofa. See grp. 37 p. 446.	2819
	taking of complete furniture of rooms, palaces, hotels, villas, &c. in modern	F. Gerstenhauer, Tischler * Karlsruhe * Garden benches. See grp. 37 p. 447.	2820
	and historical styles. Highest awards at the exhibitions of Munich, Melbourne, Chicago, Turino. See German wine restaurant p.362 and grp.37 p.448.	J. Glückert, Hof-Möbelfabrik, Gross- herzogl. Hessischer und Kaiserlich Rus- sischer Hoflieferant * Darmstadt * Entire interior fittings of representation	2821
2810	A. Bembé, Hosmöbel- u. Parkettsabrik * (Dainz * Founded 1780. Speciality: Complete furnishing of villas, mansions,	hall in the State Building of South west German States. See grp. 37 and 44, p. 453, 456 and 463.	
	yachts, &c. References: North German Lloyd, Bremen; Hamburg-America Line, Hamburg; Mr. Adolphus Busch, St.	W. Grimpe * Magdeburg * Corner- cupboard. See grp. 37 p. 450. Joh. Gumbold, Kunst- und Möbeltisch-	2822
2811	Louis. See grp. 37 p. 452. J. Buyten & Söhne, Möbelfabrik *	lerel * Königsberg i. Pr. * Vitrines for the amber exhibition: Precious woods	
2812	Düsseldorf * Furniture. See grp. 37 p. 448. Adolf Dietler * Freiburg i. B. * Furni-	combined with amber. Herm. Heimster jun. * Magdeburg * Writing table (Patent Bernhard Göbel)	2824
	ture manufactory. Architect for in- terior decoration, by special appoint- ment, knight of several orders. (Speci- ality: artistic interior architecture,	and writing chair. See grp. 37 p. 450. Rud. Hertzog * Berlin C. * Furniture exhibition. See p. 359 and 362 and	2825
	about 150 workmen, founded 1857.) See grp. 37 p. 446.	grps. 37, 43, 44 and 58 p. 455, 462, 463 and 468. See advertisements p. 31. Paul Hümer, Joiner * Berlin, Baruther	2826
2813	W. Dittmar (Inh. Otto Lademann) * Berlin, Molkenmarkt 6 * Founded 1836. Special workshops for joining, wood	Strasse 15 * Writing table. Jacobi & Kertell * Frankfurt a. (17). * Cupboards for the Food Supply Exhibition.	2827
	work, carving, drawing of furniture, painting, draperies. House for com- plete furnishing of interiors, according	O. Killmey * Magdeburg * Adjustable writing chair. See grp. 37 p. 451.	2828 2829
2814	to the taste of the German cultivated public. See p. 377 and grp. 37 p. 445. Dresdener Werkstätten für Handwerks-	Kimbel & Friederichsen * Berlin, York- strasse 43 * Furniture, figures, frames, upholsteries. See German State Building	2629
2017	kunst * Dresden * Single pieces of furniture and complete outfits of dwellings, and all requirements of the house.	p. 359 to 361 and grps. 37 and 43 p. 457 and 462. Kohlbecker & Sohn, Möbelfabrik * München * Outfit of room and furniture.	2830
ŝ	Medals in Dresden, Paris, Turino. See grps. 37 and 41 S. 449 and 460.	See grp. 37 p. 448. W. Kümmel, Möbelfabrik * Berlin O.,	2831
2815	P. Ecke, Schmidt & Cie., Malergeschäft und Werkstätte für dekorative Kunst * München * Bed room furniture. See	Frankfurter Allee 47 * Furniture. See grps. 37, 43 and 75 p. 449, 454, 462 and 475.	
2816	grps. 37 and 43 p. 449 and 462. Ch. Encke * Magdeburg * Panelling and	P. Meissner * Magdeburg * Book case and table. See grp. 37 p. 451.	2832
2817	cupboards. See grp. 37 p. 450. J. A. Eysser * Bayreuth (Bayern) *	H. Näter * Magdeburg * Chairs and stools. See grp. 37 p. 451.	2833
	Furniture factory, since 1847, by special appointment to several courts, many awards, among which gold medals	J. L. Peter, Hofmöbelfabrik * Mannheim * Sofa, cupboard and stool. See grp. 37 p. 446.	2834
	Nürnberg 1882, World's fair Amsterdam 1883 and Nürnberg 1896 (Speciality: Furnishing of dwellings). See	J. C. Pfaff, Möbelfabrik * Berlin, Zeug- hofstr. 3 * Vitrines and tables for the Exhibition of the ministry of agriculture.	2835
2818	grp. 37 p. 447. Eduard Frei, Kunsttischlerei * Darmstadt * Reading and writing table,	C. Prächtel, Court joiner * Berlin, Krausenstr. 31/32 * Furniture. See grps. 32, 33, 37 and 42 to 44 p. 441	2836
	stool, upholstered and covered. See grps. 32, 33, 37 and 43 p. 441, 442, 453 and 462.	449, 454, 455, 460, 462 and 463. Probst & Boeker, Joiners * Berlin, Maybachufer 5 * Joinery. See grp. 37 p. 451.	2837
	455 and 462.	vacnuter 5 * Joinery. See grp. 31 p. 451.	

2838	Ed. Puls, Eisenkonstruktions- und Kunstschmledewerkstatt * Berlin-Tempelhof * Vitrines in iron and bronze for the exhibition.	Stuttgarter Möbelfabrik Georg Schöttle * Stuttgart * Corner arrangements with upholstered seats, drawing room cupboard, table, easy chairs and chairs.	2849
2839	F. Ad. Richter & Cie. * Rudolstadt * Furniture in the nursery (Toy Hall). Designed by Arno Körnig, Wilmersdorf. See grps. 21 and 36 p. 416 and 445.	Vitrines of the Orivit Co. Limited. See grp. 37 p. 456. Gebrüder Chonet * Berlin, Leipziger Str. 88 * Easy chairs of wood, garden chairs. See German State Building	2850
2840	Gebrüder Röhlich * Berlin, Beuthstr. 6 * Purveyors to H. M. Kaiser William II.	p. 362. Udluft & Hartmann * Dresden * Vi-	2851
	Factory exists since 1837. Paris 1900 gold medal. Special factory for interior fittings of halls, drawing rooms, boudoirs in the following historical styles: Rococo, Louis XIV, Louis XV, Louis XVI	trines. See grp. 37 p. 449. Vereinigte Werkstätten für Kunst Im Handwerk, G. m. b. H. * München * Fittings of room and furniture. See grps. 11, 14, 30 to 32, 37 and 47 p. 400,	2852
	and Empire. Ceilings, wall architecture, door panelling, &c. Exhibited in German State Building: 1. Large banquet hall, copy of the oak-gallery in the palace	401, 438, 440, 441, 448 and 465. Wilhelm Volgt, Möbelfabrik *Berlin NO., Weberstr. 3 * Established 1857. Furniture. See grp. 37 p. 455. Werkstätten für deutschen Hausrat *	2853 2854
	at Charlottenburg-Berlin. 2. Galloon Hall, also copied from the Charlotten-burg Palace, doors carved in oak, remaining ornaments in Röhlich art	Dresden * Furniture. See grp. 37 p. 449. Werkstätten für Wohnungseinrichtungen * München * Outfit of room and	2855
2841	material. See p. 361. Ludwlg Schäfer * Wainz * Sitting room and music hall. See grps. 32, 37, 39, 41, 43 and 44, p. 441, 452,	furniture. See grp. 37 p. 448. Group 39.	
	453, 460 and 463.	Stained glass.	West of the second
2842	Shannon-Registrator-Co. (Aug. Zeiss & Co.) * Berlin W. * Manufactory of modern office fittings and writing	Josef Baranek * Berlin, Pallisaden- strasse 100 * Artistic glazing. See grp. 37 p. 451.	2856
	materials founded 1884. Gold medal Worlds Fair Paris 1900 and many	Benz & Rast * Darmstadt * Artistic glazing. See grp. 37 p. 453.	2857
	others. Diplomas as purveyors to 8 Courts. Sole proprietor Aug. Zeiss, Kgl. Preuss. Kommerzienrat, Knight of high orders. See German State Building p. 359 and 360.	August Cammissat & Paul Braunagel * Strassburg i. E., St. Urban 20 * Artistic glazing: Silhouette of Strasburg. Fire-place-window. Screen glass-filling: Children of Alsace. Gold medals Carls-	2858
2843	C. Schoppmeier * Magdeburg * Cup- board. See grp. 37 p. 451.	ruhe 1901, exhibition of stained glass. See grp. 37 p. 454.	
2844 2845	W. Schottstedt * Magdeburg * Corner cupboard. See grp. 37 p. 451. F. A. Schütz, Hofmöbelfabrik; Inh. Cas-	Hans Drinneberg, Glasmaler * Karls- ruhe i. B. * Stained window glass. Awarded first prizes. See grp. 37	2859
	par & Herwlg * Leipzig * Workshop for modern art furniture. Founded	p. 446 and 447. Wilhelm Duchrow * Magdeburg * Glass	2860
	1841. All wood architecture, joinings, and the figural and ornamental carvings of the Leipsic music room are carried out by this firm. Furthermore carried	windows. See grp. 37 p. 451. Fr. Endner, Hofkunstglaser * Darmstadt * Glass windows. See grp. 37 p. 452 and 453.	2861
	out by this firm: All moveable fur- niture after designs by Caspar and Möckel, Architects. See grp. 37 p. 450.	Paul Förster * Berlin W., Nürnberger Str. 44 * Institution for art stained glass. "Rose Queen," a glass painting	2862
2846	August Simon * Berlin SO. * Seats. See grp. 37 p. 455.	for a villa or country house. Wilhelm Goergens, Glasmaler * Magde-	2863
2847	H. Stahl * Magdeburg * Cupboard and what-not. See grp. 37 p. 451.	burg * Glass windows. See grp. 37 p. 451.	
2848	H. Stroucken, Möbelfabrik, Inh. Josef Krebs und Architekt Hugo Koch * Krefeld * Flat writing table, stools and chairs after designs by Prof. Eckmann.	Helnrich Hahn * Frankfurt a.M. * Work- shops for modern art glazing. "Joy of Life," "The dance." Art glazing of opalescent glass after designs by Prof.	2864

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	Hans Christiansen, Darmstadt. Greatest effect obtained by lead glazing without painting.	G. Krüger, Bronzewarenfabrik * Berlin, Prinzenstr. 21 * Furniture fittings. See grp. 37 p. 455.	2880
2865	R.C.Kænigsberg * Schwerin i.M. * Glass staining, mosaic and art glazing for churches and private residences. Art glazing in opalescent glass. "Summer	C. Müller, Kunst- und Bauschlosserei * Berlin, Alte Jakobstr. 78 * Wrought brass mounts with handles on the entrance doors. Mounts.	2881
2866	cvening in Vierlanden." C. Prächtel, Court purveyor * Berlin, Krausenstr.32 * Stained glass windows. See grps. 32, 37, 38, 42 to 44, p. 441, 449, 454, 455, 458, 462 and 463.	J. Ostertag * Aalen (Württbg.) * Factory for safes. 200 hands. Established 1867. Prominent export. Awards: Chicago 1893. Jeweller's cupboard with art painting. Ludwig Schäfer, Möbelfabrik * (Dainz *	2882
2867	Val. Saile, Glasmalerei und Kunstvergla- sungen * Stuttgart * Window pane with glass staining and art glazing.	Lustre. See grps. 32, 37 to 39, 43 and 44 p. 441, 452, 453, 459 and 463.	2883
2868	Ludwig Schäfer, Möbelfabrik * Mainz * lvory-opalescent-glazing and lead fram- lng. Miniature glass pictures. See grps. 32, 37, 41, 43 and 44 p. 441, 452, 453, 459 and 463.	* Tactory for metal goods and bronze castings. Lustres in all styles for electric light and gas. 175 hands. Established 1865. Holder of the Royal Saxon State (Medal, gold, silver, &c.	2884
2869	H. Schreyer, Glasmaler * Leipzig * Glass windows. See grp. 37 p. 450.	medals, awarded in Halle, Cassel, Stutt- gart, Leipsic, Nuremberg, Chicago,	
2870	J. A. Schuler * Mainz * Workshops for art glazing. Stained glass windows. See grp. 37 p. 452 and 453.	Paris. (Palace of Liberal Arts.) Schulz & Holdeflelss, Art smith * Berlin * Gas lanterns and fire place	2885
2871	Gustav Schulze & Jost * Berlin, Fried- richstr. 16 * Art glazing in brass fram- lng. "The Thought," art glazing in lead framing "Difficult Choice."	dogs. See German State Building p. 362 and grp. 37 p. 457. K. A. Seifert, Kronleuchter- und Bronze- warenfabrik * Mügeln, Bez. Dresden *	2886
2872	A. Staudinger, Glasmalereianstalt * München * First awards for artistic execution, sacred and secular.	Bronze candles for electric light. See grp. 37 p. 453.	2007
2872a	Carl Ule, Anstalt für Glasmalerei, Ver- glasung und Glasmosaik * München * Window, "Guardian angel of German	Franz Spengler * Berlin, Lindenstr. 44 * Door mounts on the fittings of the German State Building, carried out by Röhlich Brothers. See p. 361.	2887
	Empire," in lead framing.	Süddeutsche Lüsterfabrik, G. m. b. H. * München 41 * Lamps. See grp. 37 p. 447.	2888
	Group 41.	Gebr. v. Zschock, Kunstschlosserei * Strassburg-Neudorf * Lamps. See grp. 37 p. 454.	2889
	Hardware.		
2873	Ausstellung der Bernsteinindustrie. See p. 401, 440, 441 and 444.	Group 42.	
2874	Alb. Becker * Magdeburg * Electric light installation. See grp. 37 p. 450.	Paper Hangings. (Palace of Liberal Arts.)	
2875	Louis Busch * Mainz * Lamps, night lamps. See grps. 33 and 37 p. 442 and 452.	Carl Schoening, Eisengiesserel und Werkzeugmaschinenfabrik, Aktiengesellschaft * Berlin-Reinickendorf * The	2890
2876	Dresdener Werkstätten für Handwerks- kunst, Inh. C. Schmidt * Dresden * Window and door mounts. See grp. 37 p. 449 and 458.	works exist since 1857 and carry out the following specialities: part I and II Iron castings; manufacture of finest cast, engros articles made by machinery.	١
2877	H. Frost & Söhne * Berlin SW., Wilhelm- strasse 6 * Lamps for the German State Building. See p. 359, 361 and 362.	Molten quantity 40-50,000 kg per day. Part III and IV Machine works. Manufacture of shaping machines and wall paper printing machines. The wares	
2879	R. Jahn * Magdeburg * Lamps. See grp. 37 p. 451.	repeatedly received awards, and in 1896 the Royal Prussian State Medal.	

The following machines patented in all countries are among the exhibits: Oilwall paper printing machine for 6 colours, oil wall paper priming machine with automatic machines for putting up in bales and appliances for making "Freilichttapete" after a printing method, patented in all countries. The machines print on an average 4–5,000 m per hour of unfading and washing hangings.

Helnr. Uihlein * Hannover * Factory of wall paper. Speciality: Hand painted wall coverings and stuff-like wall hangings. See grp. 43 p. 463.

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J. Zuber & Cie., K.-A.-G. * Rixheim (Oberelsass) * Established 1797. Manufacturers of high class hand- and machine-made paper hangings. Landscape and floral mural decorations. Embossed leathers, &c. Silk and Wool Flocks. Gold and Bronze grounds. Finest machinemade chintzes, tapestries, &c. Highest awards at the Paris, London and Chicago Expositions.

Group 43.

Carpets, tapestries and fabrics for upholstery.

Exhibit of the "Verein der Künstlerinnen und Kunstfreundinnen" * Berlin * See p. 399-401, 438, 440, 441, 456, 457 and 467.

Ludwig Alter, Hofmöbelfabrik * Darmstadt * Carpets and wall hangings. See grp. 37 p. 445, 452 and 457.

Christoph Andreä * Mühlheim a. Rh. * Velvet. See grp. 37 p. 449.

Frl. A. Angermann * Dresden * Wall applications. See grp. 37 p. 449.

Barmer Teppichfabrik, Vorwerk & Co. *
Barmen (Rhenish-Prussia) * Established
1884. Carpets: First class Wilton- and
Brussels, piecegoods, staircase and
seemless square carpets. Patent Smyrna
and Schiran Victoria carpets. An excellent substitute for real oriental carpets. Upholstery stuffs: first class moquettes, fancy and plain plushes, velours
de Gênes. Machinery: Patented looms
for patent Victoria carpets. Patent
Jacquard-card-cutting machines. Agent:
Otto T. Schuller, Broome Street 450/452,
New York. See German State Building
p. 360, 361 and grp. 37 p. 449.

Benjamin & Co. * Berlin, (Delchiorstr. 23 * Carpets woven by machinery after designs by modern artists.

Benneke & Lattey * Magdeburg * Hand made Smyrna Carpet. See grp. 37 p. 451.

Holzdrahtrouleausfabrik E. Berliner Boeck * Berlin, Reichenberger Str. 154 * Established 1875. Wood Wire Blinds are used as a protection from sun and rain for all kinds of windows, in museums, hotels, schools, houses, verandas, balconies, serres. They are also employed as shades for glass roofs, glass houses, green houses and shopwindows. To soften the roof light and as a protection from the sun, and as decorations for the ceilings and walls fireproof and painted Wood Wire Blinds, have been used in the Great Hall. Bronze room, Toy room and Amber room, together about 1,700 sq.m., of the German department of St. Louis Exhibition. Wooden wire strips to a length of 4-5 m are made by hand by means of a plane and then woven also by hand. In fact the whole work is hand production. Silver medal, Berlin Art Industry Exhibition.

Bretting & Römer * Magdeburg * Cocoanut carpet as floor covering. See grp. 37 p. 450.

Richard Butz * Magdeburg * Leather work.

Delmenhorster Linoleumfabrik * Delmenhorst b. Bremen * Linoleum and Lincrusta in the Office of the commercial member of the Government Commission. See p. 360.

Deuss & Oetker * Krefeld * Stuffs over the panellings. See grp. 37 p. 448.

Deutsche Linkrustawerke, Pallas Marke, Gerhard & Cie. * Höchst a. Main * Lincrusta as wall covering. See grp. 37 p. 453.

Deutsche Linoleum- und Wachstuch-Compagnie * Workshops: Linoleum factoryRixdorf andEberswaldeLinoleum works * Established 1882. Factory area 100,000 sq.m. 51 buildings, 29 steam engines and steam pumps. 2,000 h.p. 600 hands. Capital invested, about 7,000,000 marks (1,750,000 \$). Products: Uni, granite, printed, inlaid. Special patent methods. Patent monopoly in all countries for Rixdorf parquette inlaid, special carpet inlaid, marmolite inlaid. Awarded the "Kgl. Preuss. Staatsmedaille für gewerbliche Leistungen." Exhibits consist of raw material, half finished and finished products.

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2908	Carl Dürfeld * Chemnitz I. S. * Wall hanging with pattern. See grp. 37 p. 450.	E. Koeberlé * Strassburg i. E. * Cushion and Chair Covers in discoloured plush. See grp. 37 p. 454.	2920
2909	P. Ecke, Schmidt & Cie., Malergeschäft u. Werkstätte für dekorative Kunst * München, Wassmannplatz 8 * Carpet. See grps. 37 and 38 p. 449 and 458.	Gustav Kottmann, Möbelstoffweberel * Crefeld * Material for upholstered furniture. See grp. 37 p. 455.	2921
2910	Eduard Frei, Kunsttischlerel * Darmstadt, Grafenstr. 27 * Basra Carpet. See grps. 32, 33, 37 and 38 p. 441, 442, 453 and 458.	W.Kümmel, Möbelfabrik * Berlin, Frank- furter Allee 117a * Window Curtains, Carpets and Wall hangings. See grp. 37 p. 75, 449, 454, 455, 458 and 475. Kunststickerelschule des Badlschen	2922
2911	Germanla · Linoleum · Werke A. · G. * Bietigheim * 100,000 sq.m. area, 6,000,000 sq.m. capacity of output. Li-	Frauenvereins * Karlsruhe i. B. * Tapestries. See grps. 14, 37 and 58 p. 401, 446 and 468.	2923
	noleum: plain, printed or granite up to 3 m width. Inlaid, Colours right through after original method. Best and	Emma Läuger * Lörrach (Baden) * Tapestry. See grps. 37 and 58 p. 446 and 468.	2924
	newest patterns after first class artists designs. Best technical finish. Purveyors to the German Imperial Navy and many Government and Civil Bodles. Exhibition Cabin in the Palace of Liberal Arts and the floor covering in the German State Building and a large part of the German Sections. See p. 359.	Linoleum-Fabrik (AG.) * Maximilians- au, Rheinpfalz * Best Goods especially for hard wear. Specialities: Corselet Linoleum for the Imp. Navy. Cork linoleum absolutely sound deadening, warm and very durable (see Badisches Kunstgewerbe: Prof. Hoffacker, Billing and Läuger). Cork, sound deadening,	2925
2912	Th. Gotzes * Krefeld * Velvet and Gold Brocade, Stamped stuffs. Hangings in gold and silk. Palace of Liberal Arts.	warmth giving linoleum lining, spe- ciality recommended for use with orna- mental Jaspe. Wood and Carpet effect	
2913	Adolf Grunow, Gebhardt u. Rössel Nachf. * Berlin, Markgrafenstrasse 53 * Carpets. See p. 362.	lasting. Jaspe on corkment is exhibited in the room of Rudolph Hertzog. Several larger orders of late: Club for officials dwellings (subsidised by the state):	
2914	Rudolph Hertzog * Berlin C. * Oriental Carpets in the Palace of Art. Modern Carpets after Artists Designs. See p. 359, 362 and grps. 37, 44 and 58 p. 455, 458, 463 and 468. See advertisements p. 31.	cork carpet with jaspe, granite, &c. 42,000 sqm. Lunatic Asylum Eglfing-München: 22,000 sqm. Rebuilding of the Kgl. Amtsgericht Dortmund: Jaspe and Uni, about 10,000 sqm. Siemens & Halske, Berlin: corklinoleum, 15,000 sqm.	
2915	S. A. Hesslein & Co. * Nürnberg * Furniture stuffs and Carpets. Sample Stock in Berlin, Hamburg, Cöln a. Rh. Extensive Store, always containing the latest novelties. See grp. 37 p. 455.	Reichstags-Präsidialgebäude, Reichs- Marine-Amt: cork linoleum, 3,000 sqm. each. Disconto Co., Deutsche Bank, Berlin, Bavarian Bank of Commerce, München: cork linoleum. lmp. German	
2916	Karl Hozák * Neuendorf-Nowawes near Berlin * Handmade Smyrna carpet. See grp. 37 p. 454.	Post about 50,000 sqm. See grp. 37 p. 446. Gebrüder Mengering * Magdeburg, Alte	2926
2917	Mathilde Huber * Mainz * Embroidered Wall Carpet. See grp. 37 p. 454.	Ulrichstr. 3 * Hand made wall hangings. See grp. 37 p. 451.	
2918	Georg Hulbe, Kunstgewerbliche Werkstatt für Lederarbelten * Hamburg, Lindenstr. 43/46 * Room of a wealthy Collector of objects in Leather. See	Noss & Lucas, Möbelstofffabrik * Elber- feld * Woollen and silk stuffs for furniture and curtains, figured mohair plush. (Palace of Liberal Arts.)	2927
2919	grps. 14 and 34 p. 401 and 444. Kimbel & Friederichsen * Berlin, York- strasse 43 * Carpets and hangings for walls of a gentleman's study and ante-	C. Prächtel, Hoftlschlermelster * Berlin SW. 19, Krausenstr. 31/32 * Wall hangings. See grps. 32, 37 to 39, 42 and 44 p.441, 449, 454, 455, 458, 460 and 463.	2928
	room. See German State Building p. 359 and 360 and grps. 37 and 38 p. 457 and 458.	Eugenle Reinhard, Kunstweberel, Kunststickerel und Kunstgewerbe * Berlin W., Courbièrestr. 9 b, l * Art embroideries	2929
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	and portières, wall coverings. See grps. 37 and 58 p. 455 and 468.	Rudolph Hertzog * Berlin C. * Curtains, embroidered flag and banners. See	2944
2930	Guido Roeder & Co. * Ansbach i. Bayern * Hand made Smyrnas.	German State Building p. 359 and 362 and grps. 37, 43 and 58 p. 455, 458,	
2931	Sächsische Kunstweberei Claviez, Aktien- gesellschaft * Adorf i. S. * Veivet.	462 and 468. See advertisements p. 31. B. Hochstetter, Blätter u. Biumenfabrik	2945
2 932	Ludwig Schäfer, Möbelfabrik * Mainz * Carpets. See grps. 32, 37 to 39, 41 and 44 p. 441, 452, 453, 459, 460 and 463.	* Berlin * Artificial vine shoots and ivy. Paul Knüppeiholz * Magdeburg * Up-	2946
2933	Luise Spindler * St. Leonhard (Unter- Elsass) * Wall carpet with applications.	holsterings. See grp. 37 p. 451. Otto Merz * Ravensburg * Embroideries for wall hangings. See grp. 37 p. 455.	2947
2934	See grps. 37 and 58 p. 454 and 468. Fr. Steinhäuser * Hemleben i. Th. * Wall	Hans Obermayer, Blumenfabrik * München * Fancy pieces and hangings (Ob-	2948
2935	hangings. See grp. 37 p. 451. Heinrich Uihlein * Hannover * Stuff for	jects of decoration) artificial flowers. See grp. 37 p. 447.	
2936	wall hangings. (Palace of Liberal Arts.) See grp. 42 p. 461. Wilhelm Vogel * Chemnitz * Decora-	Peter Georg Palis, Inh. Carl Ramdohr Söhne * Magdeburg * Curtains. See	2949
	tions of the entrances in the Palace of Liberal Arts, wall hangings and velvet in German State Building, after designs by leading German artists. Established	grp. 37 p. 451. C. Prächtel, Court purveyor * Berlin, Krausenstr. 32 * Curtains. See grps. 32, 37 to 39, 42 and 43 p. 441, 449, 454, 455, 458, 460 and 462.	2950
2 937	1837. Awards at all exhibitions exhibited at. 1,000 hands. See p. 359 and 361. Wurzner Teppich- und Veloursfabriken	Ludwig Schäfer * Mainz * Picture frames with cut glass. See grps. 32, 37 to 39, 41 and 43 p. 441, 452, 453,	2951
2938	* Wurzen (Sachsen) * Hand made Smyrnas. 13 first awards. See grp. 37 p. 449 and 450.	459, 460 and 463. Hendrick & Carl Schultze * Düsseldorf * Leather covering and hand gilding. See	2952
2936	W. Ziesch & Co. * Berlin SO. * Art weavers to His Majesty the German Emperor and His Royal Highness the Grand-Duke of Mecklenburg-Schwerin. Manufactory of tapestries. Cleaning and	grp. 37 p. 449. Reinhold Willner, Upholsterer and decorator* Berlin, Lindenstr. 93 * Upholsterings and decorations. See grp. 37 p. 451.	2953
	repair of old tapestries. Established 1868; 1873 diploma of acknowledge-	Group 45.	
	ment; 1879 diploma of honour; 1888 diploma of honour and medal, (Dünchen; 1896 diploma of honour, silver and gold State medal, Berlin; 1900 diploma of honour and gold Government medal, Paris. See German State Buildingp. 360.	Ceramics. A. G. Norddeutsche Steingutfabrik * Grohn bei Bremen * Established 1869. Special works for glazed tiles for kitchens, bath rooms, hospitals, machine rooms, &c. Annual production about 20 millions of plates. (Mine building.)	2954
1	Upholsterers' Decorations.	See grp. 116 p. 493. Gustav Bähr, Architect * Charlotten-	29 55
2939	W. Bernau * Berlin * Stuff for wall hangings and upholsterers. See German State Building p. 360 and 361.	burg * Tilepress for making smooth and ornamented tiles and cornerpieces. (Mine building.) See grp. 116 p. 493.	2933
2940	Hubert Bringer * Darmstadt * Curtains See grp. 37 p. 452.	Heinrich Baensch, Porzellanfabrik * Lettin b. Halle * Fruit dishes and coffee	2956
2941	Robert Casparl * Berlin, (Notzstr. 72 * Leather upholsterings. Seegrp. 37 p. 455.	service. A. Bertuch * Berlin W., Mohrenstr. 59	2957
2942	J.Glückert, Hofmöbelfabrik * Darmstadt * Embroidered portières. See grps. 37	* Crockery outfit for the kitchen of the German wine restaurant. See p. 362.	
2943	and 38 p. 453, 456 and 458. J.v. Heckel, Hofblumenfabrik * Thurchen * Flower arrangements, fancy hedges	BuckauerPorzellanmanufaktur*Buckau * Hand-painted china, dining, coffee, and tea services. See grp. 37 p. 451.	2958
	and various fancy trees. See grp. 37 p. 447.	Eckerts Nachf. * Darmstadt * China. See grp. 37 p. 453.	2959

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Ph. Elchinger & Söhne * Sufflenheim (Elsass) * Office fittings, vases of hardpottery. See grp. 37 p. 454.

2961

Gailsche Dampfziegelei * Giessen * Glazed stones. See grp. 37 p. 452. Grossherzogl. Majolika-Manufaktur *

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Karlsruhe i. B. * Vases, wallplates, artistically finished paintings, decorated wall tiles for exteriors and interiors, fire places, stones, &c., china painting. Art management: W.Süs, assisted by Prof. Dr. Hans Thoma, Director of the Grand Ducal picture galleries. General agent: C. F. Otto Müller, Kaiserstr. 144, Karlsruhe i. B. See qrp. 37 p. 446 and

2963

Reinhold Hanke * Höhr b. Koblenz * Purveyors to H. M. the Empress and Queen. Modern Rhine Pottery, showing artistically finished shapes accentuating the constructive idea and character of the material. Decorations in salt glazing, red of copper oxydul and other high fire glazings.

2964

Rudolf von Heider, Sculptor, Teacher at the Kunstgewerbeschule * Elberfeld * Art ceramics: Busts, animals, vases, objects of use. See grp. 14 p. 401.

2965

Gebrüder Heubach, A. G. * Lichte bei Wallendorf (S.-M.) * China factory, founded 1870. Paintings, art and fancy china, bisque figures, toy services, toys. 500 workmen.

2966

Markt-Red-Porzellanfabrik witz, Jaeger & Cie. * Markt-Redwitz in Bayern * Founded 1897. 300 hands. Speciality: Fine table ware of all kinds. and fancy objects. Most modern high fire colours, and both glazings.

2967

A.W.Fr. Kister * Scheibe (Schwarzburg-Rudolstadt) * Manufacturer of China-Established 1838. Export to all civilized countries. Representatives and show rooms in: Berlin, Hamburg, Copenhagen, Bucharest, Vienna, Milan, Madrid, Barcelona, Paris, Brussels, Amsterdam, London, New York. First awards at all Exhibitions, amongst others: Gold Medals in Porto Alegre 1881, Douglas 1892, Chicago 1893, San Francisco 1894, Brussels 1897. Che works produce: Finest fancy goods, viz.: figures, busts, groups, vases, flower holders, clocks, candelabras, &c. in finest white bisque and decorated in various styles; further ecclesiastical

goods, ornaments for grave stones, handles for canes, toys such as jointed babies, animals, &c.

Richard Klemm, Porzellanmalerei und Kunstanstalt * Dresden, Tillmannstr. 11 * Founded 1869. Stylish common use and fancy china of all kinds. Many

Königlich bayerische Porzellanmanufaktur * Nymphenburg bei München * Table services. Services for coffee, tea, mocca coffee and dessert. Figures, groups, art and fancy articles. State articles.

Königliche Porzellanmanufaktur * Berlin * Institution of the Royal Prussian Government for the benefit and advancement of the Ceramic Arts, founded by King Frederick the Great in 1763. Board of management: Technical Director: Geh. Reg. Rat Dr. Heinecke Artistic Director: Professor A. Kips. Director for General Administration: Director Barenthin.—Trade Mark: Royal Sceptre in blue. Mark for the decoration: Royal Globe in red .-Artistic Porcelain Ware of various materials after designs of renowned artists, figures, jardinières, cande-labras, clocks, vases, &c. decorated in different styles and techniques, especially dinner, coffee and tea-sets in elaborate decorations paintings on tiles for walls, vases in seger porcelain oxyd of copper glaze (chiwith nese red) paintings under glaze by Herr Schmuz-Baudiss.—Fire- and acid--proof apparatus for chemical purposes in laboratories or factories, cylinders for mills, porcelain parts for weaving and other machines, drums and linings for grinding mills, pyroscopical cones for the measurements of high temperatures, porous vessels and slabs out of hard baked and acid--proof material for filtering and electrolytical purposes.—500 employees, representatives in the great cities in Germany and abroad. Highest awards in Chicago 1893, Berlin 1896, Paris 1900 (two Grands Prix) and many others. German State Building p. 360 and 361, Education p. 366, Mine Building, see grp. 115 p. 493, Liberal Arts Building, see grp. 23 p. 423 and 426 and grp. 140 p. 498.

Prof. C. Kornhas, Ceramist * Karlsruhe i. B. * Architectural ceramics: Fountain in stone substance with tiles, &c. See grps. 14 and 37 p. 401 and 446. 2968

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2972	Prof. (Dax Läuger * Karlsruhe * Art pottery. See grps. 14 and 37 p. 401,	place, New York. Mosaic plates, tiles, coverings, terracotta figures, architect-	
2973	446-448 and in the Model City. W. Magnussen * Bremen * Stone substance and pottery work, kitchen board with all requirements, potteries in clay.	ural ornaments, pipes. Agency and sample stock: Charles Engelhard, 41, Cortlandt Str., New York. In the German State Building: Flooring of the verandah	
2974	See grp. 14 p. 402. Marienberger Mosaikplatten-Fabrik * Marienberg i.S. * Floor tile. See grp. 37	and the terrace. See p. 360 and 361 and grp. 37 p. 449. Wächtersbacher Steingutfabrik, Abtei.	2988
2975	p. 448. Gebr.Meinhold*Schweinsburg, Sachsen * Majolica factory. Fancy vessels, wall fountains, wall plates. Entively new	lung Chr. Neureuther * Schlierbach b. Wächtersbach (Bayern) * Tiles in high fire glazings. Werkstätten der Kunstgewerbeschule,	2989
2976	technics. Designs by artists. Hermann Mutz, Kunsttöpferei * Altona a. Elbe * Common use and fancy vessels of stained glazed high fire stone sub-	Keramik (Lehrer H. und F. v. Heider) * Magdeburg * Fountain niche and fire places, &c., vases. See grp. 14 p. 402. Wessels Wandplattenfabrik * Bonn *	2990
2977	stance. See grp. 14 p. 402. E.Nister, Kunstanstalt für graphische Reproduktionen* Nürnberg* Metachromotypes for ceramic purposes. (Palace of Liberal Arts.) Louis Noack* Darmstadt * China. See	Estd. 1895. Gold medal Düsseldorf Exhibit 1902. High class tiles of every description supplied. Huge assortment of majolica and art glazes; decorative tiles for furniture; glazed bricks.	2990
2979	grps. 37 and 47 p. 453 and 465. Hermann Ohme, Porzellanfabrik * Nie-	Group 47.	
2980	dersalzbrunn i. Schl. * Crockery for common use and fancy articles after designs by artists. The common of the co	Glass and Crystal. Ausstellung der Vereinigten Werkstätten für Kunst im Handwerk, G. m. b. H.	2991
	b. Moschin See grp. 116 p. 493. See advertisements p. 16.	* München * See p. 400, 401, 438, 440, 441, 448 and 459.	
2981	Reps & Trinte * (Dagdeburg * Institute for artistic plastic works in terracotta, cast marble, & c. Speciality: Figures for electric light. Soft china ware. See grp. 37 p. 451.	Désiré Christian & Sohn * Meisenthal, Lothringen * Engraved art glasses, re- peatedly covered, and glasses with or- namentation "between the glass layers."	2992
2982	Ph.Rosenthal & Co., AG. * Selbi. Bayern * Hard china, underglazings; art ceramics.	Awarded Paris 1900, St. Petersburg 1901, Turin 1900. See grp. 37 p. 454.	2007
2983	J.J.Scharvogel, Kunstkeramiker * München * High fire ceramics and fire places. See grps. 14 and 37 p. 402, 436, 447 and 448.	F. van Hauten Sohn, Metall- und Glas- warenfabrik * Bonn, Meststrasse * Enamelled glass wares; glass wares mounted on metal. See grp. 33 p. 442.	2993
2984	F.A.Schumann, Hoflieferant * Berlin W., Leipziger Str. 107 * China outfit for the German wine restaurant. See p. 362 and grp. 47 p. 466.	Fritz Heckert *Petersdorf I. Riesengebirge * Glass factory. Common use and fancy glasses. Preuss. Staatsmedaille for art industry productions. First prizes at Art- and Industry-Exhibitions. Founded 1866.	2994
2985	Franz Steigerwalds Neffe, Hofglaswaren- Wanufaktur * München * Wajolicas. See grp. 47 p. 466.	250 workmen. Gebrüder Helzel * Dresden, Bismarck- platz 13 * Pat. advertisement mirror.	29 94a
2986	Conwerke Kandern * Kandern * Fire places and wall flames, wall tiles, Prof. Läuger art potteries. See grp. 37 p. 446.	Siegmar Lewy * Berlin, Ritterstr. 24 * Galvanoplastically decorated art and fancy articles of glass, porcelain, &c. See grp. 31 and 33 p. 440 and 443.	2995
2987	VIIIeroy & Boch * Mettlach (Rhein- preussen) * Founded 1841. 7 branch works. 7,000 hands. 2,450 H.P. 46 awards at exhibitions, among others:	Louis Noack, Hoslieserant * Darmstadt * Glasses and vases. See grps. 37 and 45 p. 453 and 465.	2996
	1876 Philadelphia; 1893 Chicago; 1900 Paris, Grand Prix. Mettlach stone goods, earthen ware, majolica, water works articles, crystal and glass. Agency and sample stock: H. W. Loewe, 66, Park	Offenburger Glasmosaikwerke, G.m.b.H. * Offenburg (Baden) * Mosaics for facades and interiors. German stained glass exhibition Karlsruhe 1901 gold medal. See grp. 37 p. 446.	2997

2998 Deutsche Glasmosaikgesellschaft Puhl & Wagner. Purveyors of the German Court * Rixdorf * In the entrance hall, two designs in mosaic prepared by order of H.M. the German Emperor for the Castle of the Wartburg, representing episodes in the life of St. Elizabeth, from the series of designs by the historical painter Aug. Oetken. In the Court of honour, decorative mosaics from designs by Professor M. Seliger. The institution began in 1889 with the first attempts to introduce the art of glass mosaic work into Germany, and has since fulfilled a large number of orders for churches and monuments, amongst others for the Kaiser Wilhelm Memorial Church and the Cathedral in Berlin, for the Minster at Aachen, the Kaiser fountain at Constantinople, &c. Own glass-works for the production of mosaic materials. About 100 artists and experts employed. Gold State Medal of Prussia, and the Grand Prix, Paris. 2999 F.A. Schumann, Court Purveyor * Berlin W., Leipziger Str. 107 * Glass crystal work in the German Wine Restaurant. See p. 362 and grp. 45 p. 465. 3000 Franz Stelgerwalds Neffe * München * Vases and glasses in ground and coloured glass. See grp. 45 p. 465. 3001 Thereslenthaler Kristallglasfabriks-Niederlage, Eduard Rau * München * Industrial art glasses, vases and jugs. Group 48. Apparatus for heating. Hildeshelmer Sparherdfabrik, A. Sen-3001a king * Hildesheim * Kitchen ranges; kitchen utensils. See p. 362. See advertisements p. 18. Group 49. Apparatus and methods for lighting, other than electric. 3002 Deutsche Gasqlühlicht A.-G. * Berlin * Burners, incandescent mantles, chimneys. See German State Building p. 362. 3002a Metallschlauch-Fabrik Pforzheim, G.m. b.H. * Pforzheim * Draught-gas lamps in brass, designed by A. Hildebrand, professor at the Industrial Art School, Pforzheim. 3002b Carl Typke * Berlin * Wax candles. See

Group 53.

Equipment and processes used in

sewingand making wearing apparel.

(Palace of Liberal Arts.)

Berliner Stickmaschlnenfabrik Schirmer,

Blau & Co. * Berlin n. * Ten crank

p. 360.

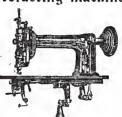
3003



handle embroidering machines of different construction, and two three-needle embroidering machines (German patents) of different construction, in use. These ma-

chines are employed in the textile and clothing industries, upholstering, curtain and coverlet manufactories, military workshops, for banners and church embroideries, &c. Estbd. 1873. First factory of this kind in Germany. Many gold and silver medals awarded at exhibitions.

Lintz & Eckhardt * Berlin O. 27 * Special factory for hand-crank embroidering machines. Manufacture of



twenty-eight tinct systems for use in all branches of the textile industry. Eight hand-crank embroidering chines of different patterns exhibited. and also other pa-

tented "Pearl" embroidering machines, quilling machines. Founded 1877. About 120 workmen. Gold medal Frankfort a.M. 1881, Antwerp 1894, Paris 1900. Medal and diploma at Chicago 1893, and State Medal Munich 1898.

Group 54.

Threads and fabrics of cotton. (Palace of Liberal Arts.)

Hugo Rudolph * Walddorf (Sachsen) * Cotton curtains, wall hangings, bed coverlets, tablecloths, and towels. See grp. 55 p. 466.

Group 55.

Threads and fabrics of flax, hemp, &c., Cordage.

Ecksteln & Kahn * Stuttgart * Founded 1864. Linen and tablecovers. Modern damask table linen from designs by first class artists. Bed and table linen in fine open-work and hand embroidery. First-prize medals, Stuttgart 1896 and 1881, Philadelphia 1877, Vienna 1873, Moscow 1872, Ulm 1871, and Paris 1867. See German State Building, p. 361 and grp. 37 p. 455. Hugo Rudolph * Walddorf (Sachsen) *

Staircase carpets. (Palace of Liberal Arts.) See grp. 54 p. 466.

Emll Schuhmacher * Bielefeld * Table linen (table cloths, napkins, serviettes,

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3008

3009	kitchen cloths) for the German Wine Restaurant. See p. 362. A. E. Stiller & Sohn * Seifersdorf bei Sorau NL. * Linen table covers, table	C. R. Elchhorn * Plauen i. Vogtland * Novelties of every sort in guipures and net laces, cotton and silk. Awards, Munich 1888, Chicago 1893, Paris 1900	3016
	cloths, napkins, towels, and dusters. (Palace of Liberal Arts.)	(Grand Prix). Curt Hartmann & Co. * Plauen, Annenstrasse 25 * Lace factory. Telegraphic	3017
	Group 57.	address "Laces," Plauen. Established 1894. Number of workmen 190. Em-	
7010	Silk and fabrics of silk.	broidered cotton silk laces, trimmings and collars of medium and finest qua-	
3010	Arnold & Braun * Crefeld * Art weavers. Speciality: Medieval Altar cloths and ta-	lities. Exports directs to all parts of the world.	3018
	pestries church-ornaments. Silver medal Düsseldorf 1902, highest award for	Hess & Martin, Spitzenfabrikanten * Plauen i. U.	3016
	church hangings. Red silk damask in German State Building. See p. 361.	G. A. Jahn * Plauen i. V. * Novelties in net, guipure and chrochet laces.	3019
3011	Erna Lundbeck * Karlsruhe i. B., Belforter Str. 14 * Silk sofa cushions (with	Speciality: embroidered robes, collars, scawes, &c. Awards, Paris 1867, Mu-	
	lithographic printing) and linen covers. See grps. 37 and 58 p. 446 and 468.	nich 1888, Chicago 1893, St. Petersburg 1903 (large gold medal, highest award),	
3012	Vereinigte Glanzstoffabriken, AG. * Elberfeld * Manufacture of artificial silk, artificial human hair and horse hair, imitation straw. Latest important inventions of the textile industry. 2,500	Paris 1900 Hors Concours, member of the international Jury. Agents: Berlin: Peter Paul Grimm, Jerusalemer Str. 62, SW. London: L. Shindhelm, 45, Gutter Lane, E. C. Paris: Georges Jourdain, 32, Rue de Sentier. Established 1835,	
	workmen. Large gold medal St. Peters- burg 1903, Silver State Medal and gold Exhibition medal Düsseldorf 1902. Gold medal Zittau 1902. (Palace of	Successor of Carl Aug. Jahn. Kempf & Paulus * Plauen (Sachsen) * Embroidery, net laces, &c., in cotton	3020
	Liberal Arts.)	and silk. Speciality: lace collars and other fashionable articles; highest qualities only.	
	Group 58.	Johannes Singer, Spitzenfabrik * Plauen i. Vogtl. * Net and guipure laces, collars,	3021
	Laces, Embroidery and Trimmings.	&c. Novelties a speciality. Grand Prix	ii.
	 Joint exhibit of the lace and embroidery industry of Plauen. 	de Paris 1900. Ernst Timmel & Co. * Plauen i. U. * Embroidered laces. Gold medal St. Pe-	3022
	Manager: Hofrat Prof. Hofmann, director of the Royal Artschool of Textile Industry, Plauen.	tersburg 1902. Wilhelm Welndler & Co. * Plauen * Embroidered cotton and silk laces.	3022a
	(Liberal Arts Building.)	2. Single exhibitors.	
3013	J. G. Baier * Plauen (Vogtland) * Established 1895. Embroidered lace in cotton and silk.	Exhibit of the "Verein der Künstle- rinnen und Kunstfreundinnen" * Berlin.	3023
3014	Wilhelm Berkling, Spitzenfabrik * Plauen und Pausa i. V. (Sachsen) * Net	See p. 399 to 401, 438, 440, 441, 456, 457 and 461.	
	and guipure laces, collars and shawls. Novelties and speciality. Awards, Wünchen 1888, Chicago 1893, Paris	F. H. Chmcke, Zeichner * Düsseldorf * Designs for embroideries. See grp. 37 p. 448.	3024
3015	1900. F.L. Böhler & Sohn * Plauen (Sachsen) * Established 1795. Mechanical weaving,	Frau C. Frauberger, Vorsteherin der Kunststickereischule, und Fräulein lrene Frauberger * Düsseldorf * Applications	3025
	hand and machine embroidery, lace making. Awards, Dresden 1825, Lon-	and raised embroideries. See grp. 37 p. 448.	
	don 1851, New York 1853, Paris 1855, 1867, &c. Laces, braid, plain goods, and collars in cotton and silk.	Frauenarbeltsschule * Heilbronn * Embroidered sofa cushion. See grp. 37 p. 455.	3026

3027	Frauenarbeitsschule * Reutlingen * Embroidered sofa cushion. See grp. 37 p. 455.	Erna Lundbeck * Karlsruhe * Sofa cushion. See grps. 37 and 57 p. 446 and 467.	303
3028	Frauenarbeitsschule des Schwäbischen Frauenvereins * Stuttgart * Embroidered sofa cushion. See grp. 37 p. 455.	Prof. Joseph (D. Olbrich, Architect * Darmstadt * Designs for art embroideries, needlework. Show carpet. See grps. 12 and 37 p. 401, 451–453.	304
3029	Frauenarbeitsschule * Ulm * Embroidered sofa cushion. See grp. 37 p. 455.	Else Oppler * Berlin * Embroideries,	304
3030	Rudolph Hertzog * Berlin C. * Estd. 1839. Gold State medal Berlin 1896. In the German State Building: Window decorations, lambrequins of silk with braid applications. Curtains of tulle	own designs. See grp. 37 p. 451. Eugenie Reinhard, Kunstweberei, Kunststickerei und Kunstgewerbe * Berlin, Courbièrestr. 9 b * See grps. 37 and 43 p. 455 and 462.	304:
	and silk, ornamented with artistically finished point lace and pillov lace. Curtains of opaque silk like stuffs, trimmed with point lace and pillow lace. Before the German State Building: 2 large banners embroidered with the	F. Rentsch * Leipzig * Application with paintings in the Great Hall, toy department, flags and banners. Gold medal Dresden and Turin. See grp. 37 p. 450.	3043
	German eagle. Stores for ladies cloths, silk wares, white wares, linen washing, finishing of complete outfits, beds, tricots, ready made things for ladies	Clara Ripberger * Dresden * Raffaels Sistine (Dadonna, embroidered. Ori- ginal technic, own invention. Paris 1900 gold medal.	304
	and children, gentlemen's suits, ties, gloves, umbrellas, curtains, covers, lino-leum. Workshops for interior decora-	Albert Schwarz * Ravensberg (Württemberg) * Curtains, blinds and stores, bed covers. (Palace of Liberal Arts.)	304
	tion and upholstered furniture. Flags and banners made in special studios. See p. 359, 362 and grps. 37, 43, 44 p. 455, 458, 462 and 463.	Luise Spindler * St. Leonhardt b. Boersch, (Unter-Elsass) * Tapestry in application embrodery. See grps. 37 and 43 p. 454 and 463.	304
3031	See advertisements p. 31. Elsa Huber * Mainz * Embroidered wall hanging. See grp. 37 p. 454.	Thiele & Steinert * Berlin C., Nieder- wallstr. 14 * Manufacturers of gold and silver wire, laces and military-goods in	304
3032	Marie Köchlin * Strassburg i. E., Grandidierstr. 1 * Embroidered cushions and chair coverings. See grp. 37 p. 454.	Freiberg, Sachsen. Estd. 1693, rebuilt 1884, fitted out with modern machines. Awarded first prizes at Sidney 1879,	
3033	Kgl. Spitzenklöppel - Musterschule * Schneeberg (Sachsen) * 5 pieces of hand made pillow lace.	Melbourne 1880 and Chicago 1893; at Nürnberg 1885 silver medal and Freiberg i. S. 1894 the Sächs. Staatsmedaille. Exhibit. Antique Frinces as forwards and	
3034	H. Krüger Wwe. * Schiffbeck b. Hamburg * Art embroideries. Flowers, butter- flies in natural colours. Filligree orna-	hibit: Antique fringes, &c. for walls, and lambrequins as well as for the furniture of the Brandenburg Chamber of the German State Building. See p. 361.	
· Drugger and the control of the con	ments. Estd. 1880. Gold, silver and bronze medals awarded. Articles were bought by the Germanische Museum, Nürnberg, Kgl. Gewerbemuseum, Stuttgart, Polytechnische Verein, Würz-	Tröltsch & Hanselmann * Weissenburg a. Sand (Bayern) * Galloons for the Galloon hall of the German State Build- ing, after antique designs. See p. 361.	304
3035	burg, &c. (Palace of Liberal Arts.) Kunststickereischule des Badischen Frauenvereins * Karlsruhe i. B. * Embroidered cushions. See grps.14, 37 and 43 p. 401, 446 and 462.	Hermine Winkler, Werkstätte und Schule für Kunstweberei * Stuttgart * Curtains, Scherrebek style. See grp. 37 p. 456.	3049
3036	Emma Läuger * Lörvach (Baden) * Embroidered cushions. See grps. 37 and	Group 60.	
3037	43 p. 446 and 462. Paula Langbein * Magdeburg * Sofa cushion. See grp. 37 p. 451.	Leather, Boots and Shoes, &c. [Palace of Liberal Arts.]	
3038	Minna Lang-Kurz * Magdeburg * Table strips and needle work. See grp. 37 p. 451.	L. Hegermann * Berlin N. 20, Kolonie- strasse 18–19 * Branch-Office at	3050

Gloversville N.Y., 57 South Main Street. Established 1863. Gloveleather Manufacturer and Dyer. All kinds of gloveleather. (Liberal Arts Building.)

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J. Heil * Hamburg-Wandsbeck * Leather and sandal manufacturer, dyed leather for saddle and bag makers and sandals made of one piece. Most healthy and cheapest shoes. (Palace of Liberal Arts.)

Group 61.

Various Industries connected with clothing.

[Palace of Liberal Arts.]

Herkuleswerke, Korsett- und Spiralfederfabriken, G. m. b. H. * Oberkaufungen near Kassel * Branches, factories, warehouses, &c.: Germany: Oberkaufungen and Helsa; Austria: Görkau in Bohemia; England: 5 Guildhall Chambers, London; France: Wm. Becker, 56 rue de Paradis, Paris; Russia: S. A. Blechmann & Sons, Riga; Denmark: S. Simonson, Copenhagen; Switzerland: Heinrich (Dack, Basle; America: During the exhibition special agent in St. Louis. Spirals for corsets and dress bones of pianos string wires (Trade mark "Herkules"). Patented in all countries of the world. Best, healthiest, cheapest busk and spring for stays, unbreakable and will not rust. Acknowledged by medical men to be the most prominent invention in the line of stays and clothing. Sale so far more than 120 millions. Austrian Staatsmedaille Aussig 1903, gold medal at the permanent industry exhibition Leipsic 1901, gold medal of the German academy of fashions, Leipsic 1901, honour diploma at the exhibition for Hygiene, Insterburg 1902.

Plaut & Zoellner * Berlin * Collars, cuffs, blouses, &c.

Carl Scherf * Limbach i. Sachsen * Factory established 1855. Well known House in finest Fabric Gloves. Speciality: Real Milanese Gloves in silk and Lisle thread. Export to all civilized countries.

Patent-Flachswirkerei Cöln, Schönherr & Co. * Cöln on Rh. * Original Linen mesh Underwear. Founded 1890.

Department E. Machinery.

(Palace of Wachinery.)

Group 62.

Steam Engines.

Düsseldorf-Ratinger Röhrenkesselfabrik vormals Dürr & Co. * Ratingen near Düsseldorf * Ship's water-tube boiler (marine type) 900 h.p. Maximum working pressure 190 pounds te the sq. inch. Speciality: Water-tube boilers (for stationary and ship purposes) Dürr's system. (Boiler house.)

Elsässische Waschinenbau-Gesellschaft. Kapital 14,400,000 Wark * Sitz Wülhausen i. E. * Branches: Grafenstaden i. Els. and Belfort (France). A 1,000 h.p. steam engine with piston sliding valve motion, Frikarts patent. Established 1826. About 9,000 workmen

employed. Manufactures: 1. Steam engines, turbines, blast engines, locomotives and railway material. 2. All machines for the textile industry, Spinning, wearing, printing, bleaching, cotton, wool and silk dyeing. 3. Machine tools. Awards in Paris 1900: 9 grand prizes and 4 gold medals.

Friedrich Goetze * Burscheid near Cöln a. Rh. * Copper and metal packing rings, metal packing for stuffing boxes; high pressure amatures.

Alfred Gutmann, Aktien-Ges. für Maschinenbau * Hamburg-Ottensen * Established 1885. 1 sand jet blast with rotating table No. 35 for polishing castings, 1 sand jet blast for decorating glass, 2 mechanical filters, 1 cb.-metre and 20 cb.-metres, 6 rotary pumps, 4 ro-

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tary blasts. See grps. 64, 65 and 118 p. 471 and 494.

See advertisement p. 12.

Schäffer & Budenberg, G. m. b. H. * Magdeburg-Buckau * Makers of Engine and Boiler Fittings. Established in 1850. About 3,000 hands employed in our head works at Magdeburg-Buckau and in our branch houses abroad. Branch Houses: New York, Chicago, Manchester, London, Glasgow, Paris, Lille, Milano, Liége, Zürich, Stockholm, Aussig, Hamburg and Berlin. Foreign Agencies: Vienne, Prague, St. Petersburg. Specia-lities: Pressure and Vacuum Gauges, yearlyproduction about 200,000 gauges, Cocks, Values of all description, Values with Patent Nickel Seating for superheated steam, German patent No. 90, 787. Safety and Reducing Values, Steam Traps, Governors, Indicators, Counters for reciprocating and rotary motions, Original Restarting-Injectors over 150,000 in use. Pistonless Steam Pumps, Pumps of all kinds, Lubricators of the latest pattern, Thermometers, &c., Voit's Patent Steam Pumps. Highest prizes awarded at about 50 exhibitions, e.g. diploma and medal awarded at Chicago exhibition in 1893. See p. 373 and grps. 19 and 64 p. 414 and 471.

Schütte-Kessel-Konsortlum * Bremerhaven * A boiler, Schütte's patent, is exhibited at work in the boiler house; a second smaller one, intended for a launch is shown together with a machine of the G. Seebeck Co. Bremerhaven, in the transport Department. The advantages of the boiler are: 1. rapid development of steam, 2. slight weight, 3. saving of space, 4. impreved circulation of water, 5. economy in consumption of coal, 6. cheapness in construction. "Schütte"s patent boiler therefore offors great advantages both for stationary and marine purposes. As can be seen from the plans and photographs, the main boiler has lately been cylindrically constructed and the manufacture considerably cheapened thereby. The photographs also show 2 steam boilers of the most modern constructions, each having 170 sq. metres heating surface, built for the steam yacht "Lensahn" belonging to H. R. H. the Grandduke of Oldenburg. The German patent has been sold to G. Seebeck Co. Bremerhaven. Details as to the disposal of the other patents to be obtained in German Department of Machinery Hall. See grp. 75 See advertisement p. 28. p. 475.

Stettiner Waschinenbau Akt.-Ges. "Vulcan" * Stettin-Bredow * Wanufacturer of the marine steam boiler according to Schütte's patent in the boiler house.

Group 63.

Various motors.

Gasmotorenfabrik Deutz * Original and oldest special manufactory for the construction of combustion motors, suction gas plant, motor pump works, motor locomotives for pit, field and streetrailways, motor locomobiles, motor boats for conveyance of persons and freight, canal boats, &c. Established in 1869 by the inventors of the Otto four time motor, Dr. Nikolaus August Otto and Geheimrat Eugen Langen. 260 first medals and awards, 19 government medals. 70,000 motors with a total power of 400,000 h.p. supplied. Branch factories in Berlin, Vienna, Milano and Philadelphia. 22 own branch offices in various commercial emporiums of the world. Number of workmen in Coln-Deutz: 3,000. Annual prodution 3,000 motors of 1-6,000 h.p.

See advertisement p. 23.

Group 64.

General Machinery.

Max Eberhardt, Ingenieur * München, Goethestr. 74 * Fire extinguishing apparatus "Eberhardt." See German State Building p. 359 and grp. 22 p. 417.

C. Otto Gehrckens * Hamburg * Established 1867. Factory for belting and technical leather articles. Tannery Horneburg (Hannover). Since 1869 the largest store of simple belting in the world (simple belting up to 3,000 metres and double belting up to 3,000 metres for widthalwaysonhand). Special belting for

dynamos, half cross and conical pulley driving; own German patent and patents in all foreign countries.

Leather collars in:



Corner, half cross and left hand driving.

Bowl shape,





Channel ring.

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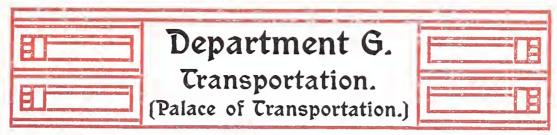
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MACHINERY Royal State's Medals of Würtemberg The largest channel ring ever made in one piece of leather exhibited (manu-1896 and Bavaria 1898, &c. "Dick" factured from the largest hide exhibited files for engineers, watchmakers, enin Paris in 1900). Walruss and other gravers, dentists, jewellers, &c. "Dick". leathers. butcher-steels, knives, cleavers, carv-3077 Alfred Gutmann, Aktiengesellschaft für ing-sets, table-sets, &c. Trade-marks: Maschinenbau * Ottensen-Hamburg * FDICK Sole agenty: John Pumps. See grps. 62, 65 and 118 p. 469, Chatillon & Sons, 85 Cliff Street, New 471 and 494. See advertisements p. 12. See grps. 29 and 30 p. 437 Laboratorium für chemische Feuer-3078 See advertisements p. 27. schutz- u. Löschmittel, Conrad Gautsch. G. m. b. H. * München, Subdirektion Alfred Gutmann, Aktiengesellschaft für 3084 Maschinenbau * Ottensen-Hamburg * Sand jet blasts. See grps. 62, 64 and 118 p. 469, 471 and 494. Berlin * Fire extinguishing apparatus. See German State Building p. 359 and grp. 22 p. 417. 3079 Friedrich Lux * Ludwigshafen a. Rh. * See advertisements p. 12. Frahm's distance tachometer. See p. 365 Orivit, Aktiengesellschaft für kunstge-3085 and 373 and grps. 19 and 23 p. 413 and 422. werbliche Metallwarenfabrlkation, vor-3080 Minimax-Apparate Baugesellschaft m. mals Rhein. Bronzegiesserei Ferd. Hub. b. H. * Berlin, Charlottenstr. 66 * Fire Schmitz * Cöln a. Rh. * Paris 1900 gold medal; Düsseldorf 1902 gold extinguishing apparatus. See German State Building p. 359 and grp. 22 p. 417. medal, silver government medal. Huber press for the shaping and decoration 3081 Polte, Armaturen- und Patronenfabrik of seamless bodies in enclosed spaces; * Sudenburg-Magdeburg * Fire brigade pressure of 6,000 atmospheres. 50 paequipment, hose couplings, stand pipes, tents in all civilized countries, innossles. See grp. 76 p. 475. Schäffer & Budenberg, G. m. b. H. * (Dagdeburg-Buckau * General fittings for machinery. See p. 373 and grps. 19 and 62 p. 414 and 470. cluding 7 American patents. See grp. 30 3082 p. 439. H. Schlüter, Spezialfabrik für Loch-stanzen und Scheren * Neustadt am 3086 Rübenberg, Prov. Hannover * Machine for cutting, punching and stamping Group 65. metals. Machine Tools. Friedrich Schmaltz, Schleismaschinen-3087 Friedr. Dick * Esslingen a. Neckar * Establ.1778. 450 workmen. 300 horse-3083 und Schleifräderfabr. * Offenbach a. (I). * Worlds Fair Paris 1900, Membre power. 50 gold, silver and bronze du Jury. Automatic sharpening and medals, among them Chicago 1893, the grinding machines of various kinds. Department F. Electricity. Palace of Electricity. 1. German Education Exhibition (Chemistry and Electrochemistry). Groups 68, 69 and 71. See grp. 23 p. 417.

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	2. Single groups.	
	The Group 67. The analysis of light. The enormous collection of heat within the inner glass causes the light obtained to increase by a standard candle per watt. The sale of these lamps is very	
3098	Land- und Seekabelwerke, AG. * Cöln- Nippes * Samples of cable, cable ar- matures, switch boards, high tension apparatus, &c. See arp. 70 p. 472.	
3099	Hugo Bremer, Neheimer Wetallwaren- und Werkzeugfabrik * Neheimon Ruhr * See p. 362 and grp. 69 p. 472. illuminated with the indirect radiating shadeless Regina and its front with the direct radiating Regina arc lamp. See p. 359 to 361.	
3100	Jul. Otto Zwarg * Freiburg i. S. * Materials and apparatuses for protection of dwellings, churches, school, dynamite, powder and ammunition magazines, &c., from lightning. Slemens-Schuckertwerke, G. m. b. H. * Berlin SW., Askanischer Platz 3 * Searchlight on the German State Building. See p. 362 and grps. 26 and 75 p. 428 and 475.	
	☐ Group 69. ☐ ☐ Group 70. ☐	
10000	Electric Lighting. Telegraphy and Telephony.	
3101	Allgemeine Elektrizitäts-Gesellschaft * Berlin * Incandescent lamps in German State Building. See p. 359. Prof. Dr. Cerebotani * München * Picture telegraph, printing telegraph, meteorological distant indicator.	
3101a	Hugo Bremer * Neheim on R. * Tachinery, metal goods and electro-technical factory. Inventor of the Bremer arc flame light, manufactured up to	3106
	50,000 candle power. According to scientific research the cheapest light of modern times. See German State	3107
3102	Building p. 362 and grp. 67 p. 472. C. Conradty * Nürnberg * Factory of carbon points for electric continuous and alternating arc lamps, vacuum lamps and arc flame lamps, galvanic	
	carbon, carbon sliding contacts, elec- U Group 11. Litrodes for electro-chemistry. Hugo Rei-	
	singer, New York, 11 Broadway, sole vendor for United States and Canada under his trade mark of "Electra." See German State Building p 362 Deutsche Hygieneausstellung. See p. 415, 416, 426, 428 and 494.	3109
3103	Regina-Bogenlampenfabrik*Cöln-Sülz* 400 hours burning time. Considerable saving of work. Burns constantly. Hartmann & Braun, Aktiengesellschaft * Frankfurt on (DBockenheim. See p. 368 and 373 and grps. 19, 23 and 1407	3110
	and photography. At 220 volts and 4 amperes more powerful than sun-	3111
	light. Rosemeyer's construction is different to all known types of lamps, being completely hermetically enclosed, and it can stand any transport; it can be manipulated by a novice and gives p. 498. "Magneta," Fabrik elektrischer Uhren ohne Batterie und ohne Kontakte, G. m. b. H. * Singen (Amt Konstanz, Grh. Baden) * Electric clocks.	3112



1. Exhibit of the Vereinigte Kgl. Preuss. und Grossh. Hessische Staatseisenbahnverwaltung, Berlin (Groups 20,74 and 138).

In Transportation Building: Illustrations and Models of Social Welfare arrangements.

Outdoor exhibit on the Forsyth Ave.: Arrangement of switches with track of rails.

The following exhibitors have contributed to this exhibition:

Group 20.

Medicine and Surgery.

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Berliner Krankenmöbelfabrik, E. Wulff & Hohmann * Berlin C. * Stretchers. Medizinisches Warenhaus * Berlin N., Friedrichstr. 108 * Life preserving box. Group 74.

Railways: Yards, Stations, Freight houses and terminal facilities of all kinds.

J. Gast, Eisenbahnsignalbauanstalt * Berlin NO. 55, Greifswalder Str. 32 * Barrier at crossing.

C. Lorenz, Telephon-, Telegraphenwerke und Sicherungsanlage * Berlin SO., Elisabethufer 5/6.

See advertisements p. 19.
Siemens & Halske, Akt.-Ges. * Berlin *
Switching and signalling gear.

Zimmermann & Buchloh, Eisenbahnsignalbauanstalt * Berlin, Badstr. 38/39 * Signalling gear.

2. Single groups.

Car and wheelwrights work.—
(Dotor cars and bicycles.

Group 72.

Benz & Co., Rheinische Gasmotorenfabrik, A.-G. * Mannheim * Benz Parsifal Motor car.

Continental-Caoutchouc- und Gutta-Percha-Compagnie * Hannover * Established in 1872, 2,500 workmen and a staff of 300 clerks and engineers employed. All kinds of soft rubber articles manufactured, such as, tubing, packing, balls, gummed fabrics, balloons, &c. Speciality the wellknown "Continental Pneumatic" for bicycles and motor cars. Branches in all civilised countries. International Exposition Paris 1900 gold medal. Exhibits: (Dotor

pneumatic tyres, latest pattern with and without safeguards. Further special types for bad travelling, as well as for racing cars; pneumatic tyres for bicycles. See grp. 19 p. 412.

Daimler-Motoren-Gesellschaft * Cannstatt * Zweigniederlassungen in Berlin-Marienfelde, Wien und Mailand. Sole manufacturers of the celebrated motor car "Mercedes." Factory for spirit, benzine and petrol motors, motor cars for convoyance of persons and freight. Motors for boats and motor launches, automobile rail vehicles, lowries up to 5 tons capacity.

See advertisements p. 4.

Metall-Industrie Schönebeck, Akt.-Ges.

* Schönebeck a. Elbe * Motor bicycle with self ignition.

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3131 Mitteldeutsche Gummiwarenfabrik Louis Peter * Frankfurt a. (D. * Oldest Pneumatic-tyre Factory in Germany. Established 1872 by the present proprietor Louis Peter. Branch agencies in all large towns of the European Continent under management of the firm. Export to all civilised countries. Specialities: Peter's Union-Pneumatic for Cycles and Motor-cars. Peter's two-parted Patentfelloe for all kinds of tyres and wheels. Solid tyres for light cars and beary omnibuses. Indiarubber articles for all technical purposes. The firm is owner of impertant inventions patented in most civilited countries, and its manufactures obtained First Prizes at Exhibitions of this See advertisements p. 25. 3132 Franz Sauerbier * Berlin SW., Friedrichstr. 231 * Factory for the Specialities: Cooling and condensing coils, patented in Germany. "Original Honey-comb-cooler." State Medal. Gold Me-Group 74. Railways: Yards, Stations, Freight houses, terminal facilities of all kinds. 3133 Friedrich Brüggemann * Hannover, Hin-

überstr. 11 * Method of compressing wooden railway-sleepers. Building p. 490.) [Forestry

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Continentale Gesellschaft für elektrische Unternehmungen * Nürnberg * Drawings and Models of the Barmen-Elberfeld-Vohwinkel Hanging way and of the projected Hanging Railways in Berlin, Hamburg and

Hannoversche Maschinenbau-Aktiengesellschaft vormals Georg Egestorff * Linden vor Hannover * Established 1836. Limited Company since 1871. One 2/5 Atlantic type express engine with four cylinders, von Borries', Patent, constructed after designs of the Hannoversche Maschinenbau A.-G., with Pielock superheater; Model of a Pielock superheater, 2,500 Workmen, Output 400 locomotives yearly, Locomotives for any purpose and any width of gauge, steam engines, boilers, pumps. Grand prix Paris 1900.

Henschel & Sohn, Lokomotivfabrik, Maschinenbauanstalt und Kesselschmiede Kassel * Established 1817. Henrichshütte, Blast furnace for casting steel and iron near Hattingen in Westfalen, as well as coal mine adjoining. 5,300 officials and workmen. Main productions: Locomotives (more than 6,900 built), steam boilers, steam engines, nut presses (own patents), machine tools, electric cranes. Henrichshütte consists of blast furnaces, puddling furnaces, mills for rough and fine plates, bar and figured iron, tube works and steel mould foundry as well as extensive auxiliary works. Exhibits: 4 Locomotives—twelve wheel compound express locomotive, No. 6.260, Wittfeld type (3 cylinders) with bogy tender (150 kms. maximum speed), 14 wheel express compound tank locomotive for mountain lines, No. 6,601 (four cylinders), both ordered for the Prussian State Railways; fourwheel tender locomotive No. 6,616 for 4' 8½" in guage, efficiency 240 h.p., six wheel plantation locomotive No. 6,617, guage 3 feet, efficiency 45 h.p. See advertisements p. 14.

Max Jüdel & Co. * Braunschweig * Fittings for Signalboxes and Signals.

G. Maas, Regierungs und Baurat * Berlin * Patented suspended rail-joint to diminish the jolting of railway cars. Patented semaphore with glass panels visible against any background.

Studiengesellschaft für elektrische Schnellbahnen, G. m. b. H. * Berlin * Drawings of the cars and experimental track of the Swift Railways. Information as to the course and results of the experiments.

Group 75.

Material and Equipment used in the Mercantile Marine.

Hamburg-Amerika-Linie (Hamburg-Amerikanische Paketfahrt-Aktien-Gesellschaft) * Hamburg * Steamship connection with the United States of America, Canada, the West Indies, Mexico, Argentine Republic, Brasil, East Asia, New York-West Indies, &c. Excursions to the Orient, to Norway, Model of the skylight and the large dining saloon of the fast steamer "Deutschland," executed by J. C. Pfaff, Berlin. Complete model of fast steamer "Deutschland." Model of the Buildings on an area of 25,000 sqm. carried out by the Society for provisional Housing 3137

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3141	of Emigrants until their ship leaves Hamburg. Shipping-Map of the World. Panorama with views of the countries and towns visited on the excursion voyages of the company. See advertisements p. 32. Hamburger Motorenfabrik C. Jastram * Hamburg, Gr. Reichenstr. 45/47 * 4 HP. Double cylinder Benzine-motor with electrical ignition, rotating winged screw and drawings.	Joh. C. Tecklenborg AG., Schlffswerft und Maschinenfabrik * Bremerhaven-Geestemünde * Established 1841. 2,000 workmen. Area 240,000 sqm. Build passenger and freight steamers, engines, boilers sailing ships, &c. of all kinds and dimensions. Dry dock and Patent slip for repairs. Exhibits: Model of the Imperial Mail steamer "Neckar" of the North German Lloyd, model of the fivemaster "Preussen,"	3149
3141a	Howaldtswerke * Kiel * Model of the	the largest sailing ship in the world, and frame with views.	
3142	Antarctic ship Gauss. See grp. 8 p. 389. Florian Krajca * Karlsruhe * Life-belt of indiarubber linea, 3 awards, used extensively; American patent on sale.	Westphalen, Propeller-Gesellschaft * Berlin, Wilhelmstr. 43b * Ships' propellers, Westphalen Patent.	3150
3143	W. Kümmel * Berlin O. 34, Frankfurter Allee 117a * Model of a ship. See grps. 37, 38 and 43 p. 449, 454, 455, 458 and 462.	□ Group 76. □	
3144	G. Lehmann-Felskowski, Naval author Berlin * Several volumes "The Ship- building Industry of Germany." Pictures	Material and equipment for the Navy; Naval warfare.	
3145	of types of ships and of quay-buildings. Norddeutscher Lloyd * Bremen * Steamship Company. Regular fast and mail steamer connection with New York, Baltimore, Galveston, Cuba, Brazil, the Argentine Republic and the Mediterranean Imperial German Mail steamer lines to Egypt, East Asia and Australia. Excursions to the Orient, &c. Voyages round the world. Model of its new pier in New York. Model of the fast mail steamers "Haiser Wilhelm 11."	Polte, Armaturen- und Patronenfabrik * Magdeburg-S. * Metal cartridges for infantry arms of every model. Daily output 250,000 cartridges. Cartridges for field guns and heavy ordnance from small to the largest calibres manufact- ured after the Polte rolling method. Projectiles and fuzes. Catridge-Machines Polte's system. Fire Brigade Appliances. Hose-Coupling. Standpipes, &c. See grp. 64 p. 471.	3151
	and "Kaiser Wilhelm der Grosse." Transparency of the fast steamer "Kaiser Wilhelm II." Terrestrial globe.	Group 77.	
3146	See grp. 26 p. 428. Schütte-Kessel-Konsortium * Bremer- haven * Steamer boilers, launch boilers. See grp. 62 p. 470. See advertisements p. 28.	Aerial Navigation. Exhibit of the Deutscher Luft- schifferverband in co-operation with:	
3147	G. Seebeck, AG., Schiffswerft, Maschinenfabrik und Trockendocks * Bremerhaven * Established 1877. The	Augsburger Verein für Luftschiffahrt * Augsburg * Wall map showing landing places for balloons.	3152
	works consist of Shipbrights yard, Engineering works, Foundry, Boiler works and 5 Dry docks with large workshops for repairs. A launch engine connected with a launch boiler	K. von Bassus * (Dünchen * Apparatus for Balloon photography, Photogrammetric Views from balloon, Photographs from balloons.	3153
3148	(Schütte's Patent). Dr. von Seidlitz, Werkstatt zerlegbarer Boote * Ebenhausen (Oberbayern) * Sailing boat. Patented in Germany, England, Norway, Sweden, Finland, Russia, North America.	Berliner Verein für Luftschiffahrt * Berlin * 1 used balloon; 1 fully equipped balloon car; 1 wall map showing landing places for balloons; 1 atlas with reports of voyages; 2 year books of the Union; lnstruct. for the presidents of societies.	3154
3148a	Siemens-Schuckertwerke * Berlin * Electrical Towing engine on the Teltow Canal. See p. 362 and grps. 26 and 69 p. 428 and 472.	Prof. S. Finsterwalder * München * Patterns for cutting out spherical balloons, Description of a new method of Photogrammetry from Balloons (with map).	3155

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H. W. L. Modebeck, Major * Graudenz * Scientific literary propaganda for the furtherance of aeronautics. 7 Volumes of "Illustrierte Aeronautische Mitteilungen." Established 1897. Published by K. J. Trübner, Strassburg i. E. Pocket

manual for flying machine specialists and aeronauts. 2. Ed. 1904. Publisher

Kühl, Berlin. Wünchener Verein für Luftschiffahrt * Wall map showing landing places for balloons.

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GL	JO GL	
	Department H.	
<u>G</u>	Agriculture.	
OL	[Agricultural Hall.]	
	1. Joint-exhibitions	
	embracing several groups.	
	3 .	
	a) Exhibit of the German Agriculture.	
	Manager: Landesökonomierat Woelbling, Berlin.	
	Group 78.	
Farm e	quipment and methods of Theory of Agriculture improving land. Agricultural Statistic	

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Landwirtschaftskammerfür das Herzogtum Oldenburg * Oldenburg * Portfolio with photographs of agricultural dwellings and farm buildings in the Grand-Duchy of Oldenburg.

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Deutsche Landwirtschafts-Gesellschaft * Berlin * Portfolio with drawings of a farm built by the German Agricultural Society.

Group 80.

Fertilisers.

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Deutsche Landwirtschafts · Gesellschaft * Berlin * 1. Graphic Representations of the consumption of crude Potassium salts for agricultural purposes in Germany in the years 1890, 1894, 1898 and 1902. 2. Portfolio with diagrams showing the employment of town refuse in agriculture. See grp. 83 p. 476 and 477.

Deutsche Landwirtschaftsgesellschaft * Berlin * The Society was provisionally founded on 14. May 1884 and finally constituted with 2,940 members on 4 Dec. 1895. At presents its members number 14,000. Its object is to further the whole technique of agriculture by arranging yearly itinerant German exhibitions, by meetings, by resums machines, by assisting business connections, by giving advice in all technical agricultural questions and by issuing publications and circulars. lt is divided for working purposes into 7 Departments and 30 Special Committees. 1. Graphic representation of the distribution of the members of the German Agricultural Society in Germany and of the significance of their itinerant exhibitions. 2. Portfolio with 17 plans of exhibitions of the German Agricultural Society. 3. The publications of the G. A. Society since 1886.

4. Graphic representation of the agricultural Associations in Germany. 5. Graphic representation of the production of grain in Germany. 6. Portfolio with tables showing the business transacted in manures, seeds and fodder through the mediation of the German Agricultural Society. 7. Graphic representation of the amount of live-stock in Germany in comparison with the area under cultivation. 8. Graphic representation of the amount of live-stock in Germany with reference to the population. 9. Nine typical photographs of horses. 10. Graphic representation of the German horse breeds and the public efforts to improve the breeds. 11. Twelve typical photographs of cattle. 12. Diagrams of the German cattle breeds and of the public efforts to improve the breeds. 13. Four typical photographs of pigs. 14. Two rotating collections of photographs of animals taken at exhibitions of the German Agricultural Society. 15. Diagrams showing the results of breeding the merino-sheep in Germany. 16. Diagrams illustrating the cultivation of the sugar-beet and the sugar production in Germany. 17. Graphic illustrations of the cultivation of the potato and of the manufacture of spirit in Germany. See grp. 80 p. 476.
Biologische Abteilung für Land- und

Biologische Abteilung für Land- und Forstwirtschaft am Kaiserlichen Gesundheitsamte zu Berlin * a) Information on the above; b) Model of the experimental field.

Direktor Dr. Hiltner, Kgl. Bayerische Agrikulturbotan. Anstalt * München * The impregnation of the Leguminosæ with pure cultivations of organisms and its results.

Group 84.

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Vegetable food products and agricultural seeds.

- Deutsche Landwirtschafts-Gesellschaft * Berlin * Collection of German Seeds.
- C. Behrens & Co. * Schlanstedt, Provinz Sachsen * Seed-corn, Sugar-beets.
- A. Le Coq & Co. * Darmstadt * Forestry and Agricultural Establishments. Speciality: Best selected grass and

chover seeds also wood and field seeds.

- F. Heine * Kloster Hadmersleben (Bez. Magdeburg) * Cultivation of seeds for sowing since 1868; Original selected cultivations of sugar-beet seeds, yielding a maximum of sugar, and of most productive seed-corn.
- A. Hoerning * Volkstedt near Eisleben * Sugar-beet plants and seed, Sugarbeets in glasses. Seed-corn in glasses and in bunches.
- W. Jäger * Könkendorf near Sadenbeck, Prignitz * North German Champagne-rye; winter seed for dry places and years; for late sowing; with strong stalks.
- O. Kirsche, Saatzüchter * Pfiffelbach. Apolda * 1. Original beet-root "Ideal." 3. Original "Square-head 2. Oats. wheat.'
- Jacob Mayer I., Saatkartoffelgeschäft * Frankenthal in Bayern (Rheinpfalz) * 193 varieties of potatoes.

Ludwig Mundt * Timmenrode am Harz ⋆ Plants and seeds of grain and peas.

Rüben- und Getreldesamenzüchterei Rittergut Aderstedt * Aderstedt-Gunsleben, Bezirk Magdeburg * 1. 50 kgs. Aderstedt Original sugar-beet seeds. 2. 50 kgs. Aderstedt Original sugar--beet seeds, husked and disinfected. 3. Aderstedt Original sugar-beets, preserved. 4. Illustrated pamphlet and water colour sketches from nature of beets affected with various discases; both being scientific work of the Experimental station of the obove firm.

O. Stelger * Leutewitz (Saxony) * Seed improvement. Established 1825. Original produce: Square head Wheat, Golden Oats, Beets. Scientific selections: Quantity and quality. Laboratory, Garden for improvements, Experimental fields. Machines for cleaning and sorting driven by electricity. Largest vields, lest qualities, great germinating power. Paris 1900: Grand prix. Victory prize and 4 large silver medals of the German Agriculturæ Society.

Fichtelgebirgs-Verkaufs-Genossenschaft * Ansbach, Bayern * Farmers association with fields for seed improvements. Gold Medal Paris 1900. Seed. -oats.

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b) Exhibit of the Kgl. Preuss. Ministeriums für Landwirtschaft, Domänen und Forsten.

	_	_	ierungsrat und vortragender Rat im oben- er. Müller, unter Beteiligung von:	
	Grou Agricultural		Kgl. Landwirtschaftliche Akademie Poppelsdorf-Bonn * Photographic illustrations, plans of situations, graphic representations, literary works.	99
318	Blologische Anstalt heitsamts * Berlin strasse 18 * Model field in Dahlem.	n NW., Klopstoc	d- Kgl. Landwirtschaftliche Hochschule 320 ck- Berlin * Photographic illustrations.	00
318	Ackerbauschule Bac Sachsen * Photogr		ns. schaft, Domänen und Forsten * Berlin	01
319	Berlin, Bismarckall instruction in bota	ee 37 ∗ Models f		
319	Otto Fennel Söhne 1851. Geodetical i Theodolites. Tache instruments. Mini	nstrument Factor ometers. Levelli	td. statistical plan of the extent of lower ry. agricultural instruction in Prussia. ng Curricula of middle and lower agricultural Colleges. Statistics of agri-	
319	Schönhauser Str. 6 instruction in physical	* Apparatus f	ng to night-schools.	00
319	table. Wilhelm Haferlandt Berlin, Friedrichstr parations for instructions botany, entomology	. 6 * Natural pr ruction in zoolog	re- 1893; Vienna 1890, Paris 1900, Munich	02
319		n NW. * Instrume ed 1857. Emplo	Landwirtschaftskammer der Rheinpro- vlnz * Bonn * Picture of a Rhenish	03
	veterinary instrume civilised countries. gold medal awarded	nts. Export to a Grand Prix a	all Landwirtschaftl. Winterschule Gross. 320 nd Förste (Provinz Hannover) * Photo-	04
	h .	eans of instructi	on Haushaltungsschule Hagen i. W. * Head-	05
319	Haushaltungsschule Hannover) * Photog		NZ Candwirtschaftsschule Claus (Pheinnes 32)	06
319	Haushaltungsschule vinz Sachsen) *		ro- plements. Landwirtschaftsschule Eldena (Provinz 32)	07
319	7 Th. Kaulfusssche Bu			
	fer * Liegnitz * Esta lective exhibition co struction for coun bildungsschule).	f the means of i	in Landwirtschaftsschule Flensburg * 320	08
319				09

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tions.

bacteriæ.

Anstalt * (Dünchen * Pure cultivations

of nitrogen assimilating Photographic illustrations. vinz Hannover) * (Deans of instruction in chemistry. Photographic illustra-

3210	Landwirtschaftsschule Liegnitz i. Schl * Establ. 1873. Has now 245 pupils. Collection of 18 artificial sets of horses' teeth, from the age of 6 weeks to 18 years, for instruction in horse breeding.	river districts. Map of the land im- provements in Prussia carried out with the assistance of public funds, one plan of each of the following: embankment and drainage systems, land reclaiming, joint drainage undertakings, correction	
3211	Landwirtschaftsschule Schlevelbein * Photograph of the Institute building.	of an un-navigable river, drainage and irrigation of meadows, pasturage for cattle, cultivation of waste land, drink-	
3212	Gebrüder Michell * Berlin NW., Unter den Linden 74a * Gypsum Busts. Milchwirtschaftliches Institut Hameln	ing water supply.—Dubislar, Regulation of mountain brooks; Graf, The embank-	
3213	(Hannover) * 6 Photographs: the Institute building, lecture hall, laboratory,	ment inspectors on the Lower Rhine. b) Cultivation of moors.	
7014	dairy, centrifugator room, cheesery. Dr. Robert Muencke * Berlin NW.,	Anstalt Bethel * Freistadt near Varel *	3222
3214	Luisenstr. 58 * Means of instruction in knowledge of the soil and dairy-farming.	Peat hospital bed. Botanische Staatsinstitute Hamburg * The flora of the Eppendorf moor.	3223
3215	Paul Parey * Berlin SW., Hedemann- strasse 10 * Text-books for instruction in middle and lower agricultural edu- cational institutes. Wall-diagrams with pictures of enemies of plants. Pictures	W. Duckert * Freienwalde i. Pomm. * von Wangenheims Peat-moss roof German patent 78,047. Substitute for wood and cement roofs, no re-tarring required, cool in summer, warm in winter. 1 sq. m. weighs 20 kgs.	3224
	of breeds (Supplements to the Agricultural Press).	Dr. Fleischer, Geh. Ober-RegRat * Ber-	3225
3216	Reit- und Fahrschule Elmshorn (Provinz Schleswig-Holstein) * Photographic illustrations.	lin * Literary works. Adolph Franck * Charlottenburg * Carbon obtained from combustion of ace-	3226
3217	Hugo Voigt * Leipzig, Nostizstr. 9 * Text-books for instruction in middle and lower agricultural educational in- stitutes.	tylene and carbon monoxide. U.S. Pat. 682,249. 710,335. Frau Gerson, Ökonomierat * Charlottenburg * Hand bore-rods.	3227
3218	WiesenbauschuleSchleusingen*Teaches the cultivation of meadows. The models	Emil Helbing * Wandsbeck * Artificial wood made from peat.	3228
	represent land improvements carried out by the school. Means of instruction may be procured from the management.	Kgl. Hofkammer der Kgl. Familiengüter * Charlottenburg * Plan of a large farm on marshy soil.	3229
3219	Wiesenbauschule Siegen (Provinz West- falen) * (Dodels of meadow cultivation road making and irrigation works.	Landesdirektorium * Hannover * Plans, models, photographs.	3230
7220	Means of instruction for meadow cultivation and road making. Projects. Literature. L. Zwirner Nachfolger * Lautenbach	Kgl. Moorversuchsstation * Bremen * Fertilisation and cultivation experiments, models, apparatus for analysis, formation of moors, photographs, maps.	3231
3220	(Baden) * Pomological atelier. Plastic imitations true to nature of varieties	Kgl. Preuss. Ministerium des Innern * Berlin * Model of Rendsburg Prison.	3232
	of fruit for educational purposes.	Kgl. Preuss. (Dinisterium für Landwirt- schaft, Domänen und Forsten * Berlin * Synoptical maps of the marshy areas in	3233
7004	Farm equipment-methods of improving lands. a) Land Improvement.	some Prussian provinces, maps and plans of land improvements carried out, graphic representation of the sinking of marshes, plans of marsh colonies, models and plans of moor buildings, oozy-places, experiment in wood-ma-	
3221	Kgl. Preuss. Ministerium für Landwirtschaft, Domänen und Forsten & Berlin & Map of waterways in the North German	nuring with moor soil. Linksemsische Kanalgenossenschaft Lingen * Plans, graphic diagrams.	3234
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3235	C. Marquardt, Ackergeräte- und Maschi- nenfabrik des Kgl. Landw. Instituts Ho- henheim (Württb.) * Manufacture of agricultural machines and implements.	Austria. 200 workmen. Speciality: Peat strewing and Peat dust for various purposes. Moss for bandages, bedding for hospitals, plaques for beerglasses,	
3236	Grossherzogliche Reglerung Oldenburg * Models, photographs, Peat-charcoal	tinder, plates for collections of in- sects, &c.	7245
3237	kilu. Ossmers * Ahausen * Wooden horse- shoes.	Verein zur Förderung der Moorkultur im Deutschen Reich * Friedenau * Established 1883, its sole object is to	3245
3238	Precht * Moorhausen * Bird stuffed with white peat.	give owners of marsh land and peat ex- pert advice for the agricultural improve- ment and industrial employment of	
3239	Graf von Schwerln-Löwltz * Löwitz * Drawings of lake-dwellings.	their land. The Society is largely assisted by the authorities on account	
3240	E. Seewald * Arnswalde * Plans for improving moor land.	of its endeavours for the welfare of the community.	
3241	Otto Strenge * Elisabeth-Fehn * Drawings of a peat-cutting machine.	Frelherr von Wangenheim, Ritterguts- besitzerauf Klein-Splegel * The manorial	3246
3242	B.Tolksdorf, Patentanwaltund Ingenieur * Berlin W., Luitpoldstr. 24 * Frost torches with fuse after Prof. Lemström- Helsingfors for preventing night frosts, prepared from turf and bituminous substances furthering combustion.	estate Klein-Spiegel, situated in Pomerania, embraces in addition to mineral soil about 250 ha marsh land which is laid out in marsh-embankment plantations, meadows and pasturages.	
3243	Norddeutsche Torfmoorgesellschaft Tri- angel * Models, maps of cultivation and of the land, photographs.	Westpreussischer Fischereiverein * Dan- zig * Publication: Fishing in marsh waters by Dr. A. Seligo, published by the	3247
3244	Ostpreuss. Torfstreufabrik Heydekrug, Aktlengesellschaft * Established 1882. State medal, Prizes of honour and First Prizes in Berlin, München, Magdeburg, Bremen, Münster, Königsberg,	Westpreuss. Fischereiverein. Danzig 1904. Westpreussisches Provinzialmuseum * Danzig * Drawings and photographs, model of a boat.	3248
	Posen, Insterburg, Tilsit. Yearly sale 5,000,000 kg. Export to Russia and	M.Ziegler * Friedenau * Peat charcoal- burning.	3249
	c) Exhibit of the Ger	rman Food Industry	
	(Groups 81, 85 to	90 and 92 to 95).	
	(Danagement: Committee of the German Frankfurt a. (D., De		
	Group 81. Tobacco.	Established 1883. Manufacture of sterilized milk. Purveyors to the Imperial German Navy, the North German Lloyd, the Hamburg-America Line, &c.	
3252	Egyptlan Cigarette Company G.m.b. H. * Berlin N.W., Passage 45/46 * Cigarettes and tobacco.	Natura-Milchexportgesellschaft Bosch & Co. * Waren i. Meckl. * Milk and cream,	3255
3253	Türklsche Zigaretten- und Tabakfabrik "Sultan" * Breslau * Tobacco and cigarettes.	sterilized in its natural state, of un- limited durability, for the tropics and at sea. Grand Prix Paris 1900. See grp. 90 p. 482.	
	Group 85.	Troponwerke Mülheim-Rhein & New York 81/83 Fultonstreet * Manufac-	3256
705.	Animal food products.	turers of highly concentrated albuminous food: Cropon (pure albumen),	
3254	Deutsche (Dilchkonservenfabrik Walcker & Co. * Bremen und Loxstedt i. Hann. *	lrontropon (albumen with iron), Malz- tropon (albumen with malt).	

3257 Gebr. Wiedemann * Wangen im Algäu * Algau soft cheese factory. Speciality: fine soft cheese. Export to all parts of the globe, agencies in Luzern (Switzerland), Como (Italy) and London (E. C.) 16 gold medals. Group 86. Equipments and Methods Employed in the Preparation of Foods. 3258 Deutsche Metall-Fräs- und Stanzwerke. Fiedler & Goldberg * Dresden * Speciality: "Salvator" filtering floors for breweries, pressed yeast factory, straw stuff factory, up to 120,000 holes per square-metre. 3259 J. M. Lehmann * Dresden 28 * J. M. Lehmann Company, New York, 88/90 Walker Street * Manufacturer of machines. Machines for cocoa, chocolate, colour and toilet soap industries. See advertisements p. 12. 3260

Seck Brothers Ld. * Dresden * Establ. 1873. 1,500 men. All kinds of milling machinery, autom. roller mill plants, malt cross mills, barley and malt clean. ing plants. Highest awards: Chicago 1893, Antwerp 1894, Bruxelles 1897, Paris 1900. Exhibited are: Four roller break mill, iron emery scourer, mid-dlings purifier "Reform," model of ring lubricators for toothed wheels, malt cross mill ("Seckmühle") with sieve balance "Chronos," Laboratory Mill for Malt analysis.

Guido Riedel * Einsiedel-Chemnitz * House and kitchen fittings: Carver "Blitz," meet turner, potcarrier, knives, spoons, larding needles, cheese forks, cork levers.

Group 87.

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Farinaceous Products and their Derivatives.

Theodor Haller * Friedrichsdorf a. Taunus * Establ.1883. Vermicelli(egg-paste) and macaroni; capacity daily 6,000 kgs. Gold medal Hamburg 1898, Paris 1900, First prize Mannheim 1902. See grp. 88 p. 481.

Hannoversche Kakesfabrik H. Bahlsen * Hannover * Branches: Berlin, Hamburg, Frankfort-on-the-Main.

700 hands employed. Specialities: Leibnitz "cakes," Leibnitz wafers, Leibnitz biscuits, Leibnitz fruits, &c. TET wrappings, German patent. Leibnitz snow rolls. Patents: German Empire, England, France, Belgium, Switzerland, Italy. Austria, Hungary, Russia, Sweden, Norway, U.S.A., Canada, &c. Awards at Worlds fairs: Chicago 1893; Paris 1900, gold medal. See grps. 88-90 p. 481 and 482.

Ferdinand North * Erfurt * Vermicelli (eggpaste) and macaroni factory.Establ. 1860. Special products: Genuine undyed vermicelli and finest hard granulated flour macaroni. Awards (12) at all Expositions exhibited at. Possessor of the Kal. Preuss. Staatsmedaille for industrial merit.

Group 88.

Bread and Pastry. Theodor Haller * Friedrichsdorf * See qrp. 87 p. 481.

Hannoversche Hakesfabrik H. Bahlsen * Hannover * See grps. 87, 89 and 90 p. 481 and 482.

Alwin (Ducke * Dresden 16 * Universal export of Dresden Christmas "Stollen," dietary victuals, biscuits, rusks and pastry. Purveyor of hygienic bakers goods to fiscal and civic hospitals and sanatoria. Purveyor to numerous princely households. Holder of royal and princely licenzes. Chief specialities: Rusk "Queen Carola," biscuits "Princess Luisa," Dresden Christmas "Stollen," hygienic nutritious salt- and Exported 1903 to albumen pastry. U. S. A., Canada, Mexico, Argentinia, Brazil, Columbia, Guyana, Peru, Egypt, Cape Colony, German East Africa, South West Africa, The Cameroons, Zansibar, AsiaticTurkey, China, Kiautschau, British East India, Dutch East India, German New Guinea, New South Wales, Victoria, New Zealand, Marianes, Tonga Archipelago and to all European countries. Mucke's products were awarded 16 gold and State medals, fiscal and civic prizes of honour, Hon. diplomas, worlds fair Paris 1900 silver medal, exhibition of the Saxon mechanic art and art industry Dresden 1896, under the patronage of the king, highest award, only

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mark numbers 19.572, 47.024 and 63.780 patented. Sole sian Mucke's wrappings: "Marke Königin Carola."

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Carl Röder * Dresden 9 * Court baker to His Majesty the king of Saxony, and purveyor to the Royal Court of Wurtemberg. Special export house for Dres-den Christmas "Stollen." Rusks and finest Paris chocolate cake. Awards: Prize of honour Vienna, Jubilee exhibition 1898 and gold and silver medal at Hamburg and Hannover 1898.

See advertisements p. 29.

Harry Trüller, Zwieback-, Kakes-, Waffelund Biskuitfabriken * Celle * One of the largest biscuit factories of Europe. Awarded with gold and silver medals at many speciality exhibitions. Chief speciality: Natural butter biscuit "Victoria," supplied to many royal households in Europe, exported to all parts of the globe. Purveyor to the German Antarctic expedition. Machines and stoves of own patented inventions.

Group 89.

Preserved Meat, Fish, Vegetables and Fruit.

Heinr. Bauer, Hoflieferant * Frankfurt a. (1). * Factory for sausages and preserves. Speciality: Frankfort sausages. 8 branches here. 16 gold sages. 8 branches here. 16 gold medals. Awards: Chicago 1893, Antwerp 1894, Paris 1900. General agent in North America: Meyer and Lange, New York. Export agent for all other countries: Harder & de Voss, Hamburg.

"Calorit," Warming of preserves without fire, Ld. * Berlin * Preserves.

Halberstadt factory for sausages and preserved meat, Heine & Co. * Halberstadt * Preserved sausages, meat.

Hannoversche Kakesfabriken H. Bahlsen * Hannover * Jams. See grps. 87, 88 and 90 p. 481 and 482.

Adolf Jung * Frankfurt a. M. * Meat and sausages, preserved.

Fleischwaren., Wurst- und Konservenfabrik Helnr. Kuhlmann * Bremerhaven * Ship outfits, export, military provisions.

Konservenfabrik Albert Rehse Sohn * Wülfel vor Hannover * Estd. 1884. Own large asparagus, vegetable and fruit growths. Hands: 500. Purveyor to the German army and navy, also to the North German Lloyd, Bremen, makes vegetable, fruit and meat preserves, mixed pickles, fruit juices, jams, &c. furthermore preserves on a greater scale (dried vegetables and soup herbs), also as a speciality preserves with cooking arrangement (German Patent 105,590); favoured with the following wire from the Scandinavian trip of H. M. the German Emperor: "Your preserves with cooking arrangement have been tried on an outing into the hills which H. M. the Emperor made with some gentlemen of the suite yesterday and have proved very good. Although there was a strong wind on the 3,000 feet high snow-coverd top, the cooking arrangement worked so well that the meat could be eaten within a few minutes. Hausmarschall Freiherr von Lynker." These preserves are remarkable for taking up the least room, for the ease of the cooking apparatus and are very handy in manœures, hunting and sport. Simplest handling, absolutly safe working? 58 different dishes always on stock? 1895 5 gold medals. World's Fair Paris, honourmention.

Casimir Spielmann * Stuttgart * Factory for preserves and sausages. Estd. 1856. Export of Stuttgart sausages to all countries. Quality and durability warranted in all climates.

Group 90.

> Sugar and Confectionary Condiments and Relishes.

Hannoversche Kakesfabrik H.Bahlsen * Hannover * Jams. See grps. 87 to 89 p. 481 and 482.

Natura-Milchexportgesellschaft Bosch & Co. * Waren in Mecklenburg * Solid extract of coffee. See grp. 85 p. 480.

Saline Lüneburg (Saline und chemische Fabrik) * Lüneburg * All kinds of crystal salt, dining-, butter-, table salt, &c. Special brand: "Kronensalz." 3276

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	p 92. I Brandies.	Paris1900, &c. also with the Silver Medal of Prussia. Furnishers to the International Sleeping Car Company.	
A. W Joint Ex Wan	ines.	C.F. Eccardt, Klosterkellerel * Kreuznach (Rhineland) * Establ. 1840, Court purveyor, Wine Merchant, Sole proprietor of the Wine Estates: "Waltershof," "Grafenstein," "Klosterberg," "Felseneck," "Eccardt's Kauzenberg" and other ex-	3287
Anheuser & Fehrs * Estd. 1869. Rhine, and Saar wines in Export to all zones tected stamp: "Kre Riesling, eig. Wac	Kreuznach a. Nahe * Nahe, Pfalz, Mosel casks and bottles. Holder of the pro- uznacher Steinberg, hstum." Agent in & Kentucky Co. 10	cellent vineyards, about 150,000 grape vines. Shipper of Rhine, Moselle, Nahe, Pfalz Wines to all countries, largest to U.S.A. Trademark: "Horseshoe." 16 highest Awards, 2 from the German Agricultural Society for tropic-proof. Gold Medal Paris 1900. Exhibited Special registered Brands, own growths: 1893 Bluine der Nahe,	
besitz, Kgl. bayerisc scher Hoflieferant * Award: World's Paris1900. Estd.186	andlung, Welnbergsher und Kgl. preussineustadt a. Haardt * Eair Chicago 1893, 52. Speciality: Rhineg opportunity: Tastfor victuals.	1893 Prinz Heinrich Blume, 1895 Burg Felseneck Cabinet, 1893 Eccardt's Kauzenberg Cabinet, 1893 Perleder Nahe (Nahetals Lobpreis), 1868 of selected finest Riesling grapes. Gebrüder Eckel * Deidesheim (Rheinpfalz) * Sole proprietor: Kommerzienrat	3288
	sbesltzer * Deides-	Fritz'Eckel. Special vineyards in Dei- desheim, Forst, Ruppertsberg, Wachen- heim. Speciality: bottled wines.	
	* Trier a.d. Mosel * Speciality: Mosel, vines.	Gebrüder Feist & Söhne * Frankfurt a.M. * Whole sale wine merchants and champagne cellars, Hainerweg 37-53. Founded	3289
sitzer. In Firma Fri lieferant * Gau-Al Own growths of 18 more than 20,000 disposed of. Only	unior, Weingutsbe- ledrich Delster, Hof- gesheim a. Rhein * 893, 1895 and 1897, litres of each to be highest awards at	1828. Export to all countries. 10,000 sq.m. cellars, partly two and three below each other. Vineyards in Worms (Liebfrauenmilch and Rauenthal. Carl Gebert * Ockfen a. Saar * Vineyard proprietor. 1.1895 Bockstein. 2.1900	3290
	Ther expositions. Frankfurt a. (D. * Chief cellars Frank-	Ockfen Herrenherz. 3. 1893 Geisterg. Julius Gensterblum Wwe. * Trier a. d. Mosel * Saar clarets.	3290a
fort o. Main, Gross branch cellars at Ert Trittenheim o. Mos Formerly proprieto de Russie, (Zeil). E veyors to His Maje peror, King of Pri	cher cenats Ftank- be Gallusstrasse 21, bach o.Rhine, Leiwen- elle. Founded 1862. rs of the old Hôtel By appointment Pur- esty the German Em- ussia; His Majesty ussia; His Majesty	Grossherzoglich Hessische Weinbaudo- mänenverwaltung * Mainz * Vineyards in Bodenheim, Nackenheim Nierstein, Oppenheim, Dienheim, Ludwigshöhe, Bingen, Büdesheim, Kempten, Bensheim and Heppenheim, about 200 acres. Cen- tral cellars in Mainz (Rhine).	3291
the Emperor of Au the King of Englan King of Italy; His	ustria; His Majesty Id; His Majesty the Royal Highness The Ise; His Royal High	J. A. Harth & Co. * Mainz * Wholseale wine merchants. Speciality: Rhinegau and Rhinehesse wines. Only sold to retailers. See advertisements p. 27.	3292
ness the Grand Du His Royal Highness Coburg-Gotha; His Highness the Archo of Austria; His Roya grave of Hesse; Hi	ike of Luxemburgh; of The Duke of Saxe- Imperial and Royal duke Franz Salvator al Highness the Landis Grandducal High-Bade. Distinguished	Hinckelund Winckler * Frankfurt a. (17). * Shippers of Hocks and Moselles. Founded 1784. Keep magnificent stock of Rhine-, Palatinate- and Moselle-Wines. Light qualities as well as an excellent selection of the finest growths and the best vintages. Agents for the United States: C. H. Arnold & Co., 27, South	3293

3294	William Str. New York.—Suppliers to the German Restaurant, World's-Fair, St. Louis. See advertisements p. 15. Gebrüder Hoehl * Geisenheim a. Rh. * Champagne Cellars. Purveyors to the Bavarian, Roumanian, Italian and Hohenzollern Royal Courts. Established	Vienna 1873, medal Philadelphia 1876, two gold medals Melbourne 1880, and medal Chicago 1893. Three Bavarian State Medals. Appointed as member or chairman of comittees of award seven times. Ten choice varieties from own vintages of 1811 to 1900.	
3295	1868. Special brands, Hoehl Kaiser- blume, extra dry and Hoehl Champagne extra dry. Latest award the gold me- dal of the Paris Exposition, 1900. Hoffmann, Heffter & Co. * Leipzig *	Reichsgräfl. von Kesselstatt'sche (Da- joratsverwaltung * Trier a. d. (Dosel * Josephshöfer of 1893, Piesporter of 1893, Oberemmeler of 1893, and Caseler of 1895.	3302
	Wine importers and exporters. Sole agents on the American Continent of the original Z.V. G. Rheingauer Winzervereine, G.m.b. H., exports from Eltville a. Rhein, f. o. b. Rotterdam, Antwerp or Bremen. Twenty varieties of the same vintage exhibited in an outbuilding of the Agricultural Hall, stand E, grown in	Johann Klein, Vine grower and whole- sale wine dealer * Johannisberg a. Rhein * Property in Johannisberg, Winkel, Geisenheim, Östrich, Mittel- heim and Hattenheim a. Rh. Court purveyor to H. M. the Emperor of Germany. Only export business in the town.	3303
	a single district. Price lists supplied. Samples for tasting at the general buffet. Principle of exhibit to show average brands of warranted pure and ori-	Kgl. Friedrich-Wilhelm-Gymnasium in Trier a. d. Mosel * Three varieties of white wine.	3304
3297	ginal wines of one vintage, 1900, grown in the chief wine district of Germany, the Rheingau, instead of picked high class brands. See advertisements p. 6. Adolph Huesgen, Vine grower and wine dealer * Craben a. d. Mosel * Choice Caseler of 1900, choice Wiltinger Schlangengraben of 1900, Steffensberger Blume of 1895, choice Steffensberger Löwenbaum of 1893. All wines of own growth.	Königlich Preussische Domänenverwaltung Berlin, Weinbau- und Kellerei- Direktion Wiesbaden * Rheingau * Vineyard property of 97 hectares. Most noted positions at Hochheim, Eltville, Rauenthal, Gräfenberg, Marco- brunn, Hattenheim, Steinberg, Rüdes- heim, and Assmannshausen. Four spacious cellars, at Kloster Eberbach, Rüdesheim, Hochheim and Eltville.	3305
3298	J. W. Huesgen * Traben a. d. Mosel * Established 1764. Wholesale wine dealer. Sparkling wines. Vineyards in Waldrach (Laurentiusberg), Enkirch (Steffansberg and Mannwingert), Traben, Trarbach, &c.	Pet. Jos. Kreuzberg & Cie. * Ahrweiler (Rheinl.) und Frankfurt a. (17). * Wholesale wine dealers, with large vineyard property. Three varieties of red wine.	3306
3299	Max Huesgen, Vine grower and whole- sale wine dealer * Traben a. d. Mosel * Piesporter Goldtröpschen of 1893,	Jakob Lintz * Trier a. d. Mosel * Vine grower. Wawerner Herrenberger of 1893, of 1899, and of 1900.	3307
3300	1897, and 1900. Adolf Jeremias, Vine grower and wholesale dealer * Mainz a. Rhein * Three varieties of white, and one of red wine.	Wilhelm Mahler, Vine grower and whole- sale wine dealer * Worms * Established 1870. Owner of Liebfraumilch-Kirchen- stück (registered number 31,022). Pro- prietor of the best Liebfraumilch po-	3308
3301	L. A. Jordan, Weingut * Deidesheim, Forst, Ruppertsberg in der Rheinpfalz * Oldest wholesale producer of the Rhine Palatinate. Vinyards owned since 1747. First gainer of prizes for quality in the	sitions, and excellent vineyards in Rhenish Hesse. Awards, Strassburg 1890, Worlds Fair Chicago 1893, St. Petersburg 1894, Giessen 1895, Darmstadt 1900, and Wiesbaden 1903.	
	Palatinate (1783-1811). Sole posessor of the ground royalties of the Kingdom of Bavaria according to the official clas-	Guido Graf Watuschka-Greiffenklau * Schloss Vollrads near Winkeli. Rheingau * Vine grower. 3 varieties of white wine.	3309
	sification. One of the largest estates which grow high quality wines in the Empire of Germany. Twenty first prizes since 1793, among others gold medal Paris 1867, Progress medal	Rud. Wilh. Maucher * Neustadt (Rhein- pfalz), Trier a. d. Mosel, Berlin * Pur- veyor to the Bavarian court. Owner of vineyard property. Three varieties of white wine.	3310

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J. W. Meuschel sen., Purveyor to the Royal Court of Bavaria, vine grower at Buchbrunn (established 1828) and Rüdesheim (established 1863) * Owner of vineyard property Schloss Steinburg,

Würzburg. Large producer of own wines: ten presses at work. cialities, finest Stein wines fre-

gistered Trade mark the "Bocksbeutel," German Imperial Patent no.7,560, U.S.A. no. 24,501) and high class Rüdesheimer wines

of own growing (regismark Trade the sun. German Patent No. 7.843). Highest awards from international and lo-

cal exhibitions, &c. Three grands prix, twenty-four gold, silver, and exposition medals, among others, Philadelphia 1876: ("The Franconia "Wines exhibited show great delicacy "in combination with a natural body "and strength, and are well made" and Chicago 1893: ("For a splendid "collection of very high class Stein "wines"). Purveyor to various courts, to first class societies and international companies, clubs and hotels. Exports to all parts of the world. Illustrations of the various kinds of vine grown in Franconia and their cultivation in the large nursery vineyards belonging to the firm.

Egon Müller * Scharzhof b. Wiltingen * Best placed vineyards on the Saar, and consequently highest degree of cultivation of the very best varieties. E.Müller's wines reached the record price of 10,500 marks per "fuder" (about 980 liters) at the yearly spring auction at Trêves. Awards at the international exhibitions of Chicago 1893, and Grand Prix Paris 1900.

J. Neus * Ober-Ingelheim a. Rh. * Vine grower and wine exporter. Rhine and Moselle wines, and Ober-Ingelheimer red wines. Sole owner of the Sonnenberg, Ober-Ingelheim.

Nohn & Söhne, Weingrosshandlung * Waldhilbersheim bei Bingen a. Rh. und New York * Vineyard property at Waldhilbersheim, Heddesheim, and Münster near Bingen. About 1,000 as of vineyards. Established 1862. Exporter to North America since 1883. For many years the largest shippers of German

wines to the United States. Export in 1900, 83,263 gallons (312,465 lltres); 1901, 79,712 gallons (298,921 litres); 1902, 90,052 gallons (337,697 litres); 1903, 102,309 gallons (383,611 litres). Highest record for the Nahe district. New York office, 66-70 Beaver Street. See advertisements p. 3.

Frau W. Rautenstrauch * Karthäuserhof bei Eitelsbach * Vine grower. Three varieties of Eitelsbacher Karthäuserhofberg Riesling of 1897 and 1900.

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Adolf Rheinart * Saarburg, Bezirk Trier a. d. Mosel * Vine grower. Three varieties exhibited.

Richter & Co. * Mülheim a. d. Mosel * Vine grower and wine dealer. Choice Elisenberger of 1884; Choice Elisenberger of 1893; Choice Elisenberger Steinberg of 1897.

Roederer & Cie., G. m. b. H. * Longeville * Largest Champagne cellars in Lorraine. Established 1893. Original vintages of Champagne and Lorraine. Four gold and one silver medal awarded in 1903 at various industrial exhibitions at home and abroad, as well as a cross of honour as highest award.

Wilhelm Ruthe * Wiesbaden * Purveyor to H. M. the German Emperor, the Grand Duke Michael Michailowitsch of Russia, the Grand Duke of Mecklenburg-Schwerin and several other courts. Award at the Paris Exhibition of 1900. The proprietor is the lessee of the restaurant of the Kurhaus, Wiesbaden, where his own wines are kept, and supplies the same also at the restaurant "Ciroler Alpen" at the St. Louis Exhibition.

Otto & Aug. Schmidt * Kreuznach, Rheinland * Export of German wines to all parts of the world.

Scholl & Hillebrand, Vine growers * Rüdesheim a. Rh. * Rhine and Moselle wines. Export to all countries. Awards Paris exhibition 1900, gold medal; Düsseldorf Industrial Exhibition, gold medal.

Freiherrlich von Schorlemersche Rentelverwaltung * Trier a. d. Mosel * Zeltinger of 1893, Lieser-Niederberger of 1899, and Brauneberger of 1900.

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3324	von Schubert * Grünhaus b. Trier * Vine grower. Three varieties of white wine.	products have already won distinctions at exhibitions, among others at the World's Fair, Chicago, in 1893. See	
3325	H. Sichel Söhne * Mainz a. Rh. * Vine grower and wine dealer. Four varieties of white wine.	grp. 93 p. 486. E. F. Elmendorf * Isselhorst i. Westfalen * Corn brandy distillery, malt	3336
3326	Carl Sittmann * Oppenheim a. Rh. * Vine grower. "Dienheimer Guldenmorgen Riesling" of 1900, "Oppenheimer Sackträger" of 1900, and choice "Oppenheimer Kreuz Riesling" of 1900 of own growth.	house, and yeast manufactory. Established 1689. 1. Old Corn brandy (German Whiskey) "Elmendörfer" brand. 2. Best double gin, distelled from corn, "Steinhäger" brand. Yearly export 1,000,000 litres. German army and navy supplied. Many high class awards,	
3327	Soehnlein & Co., Rheingauer Schaum- weinkellerei, AG. * Schierstein a. Rh. * Established 1865. Speciality: "Rhein- gold" sparkling wine. Export to all countries.	among others, Chicago 1893, Paris 1900, and the only gold medal for spirits at Düsseldorf 1902. J. A. Gilka * Berlin SW., Schützenstr. 9	3337
3328	S. Strauss Söhne, Rhenish Export Cellars * Frankfurt a. M. * Speciality: Rhine wines of own growth, "Scharlach- berger," "Kempter Berg," and "Lau- benheimer Platte."	* Manufacturer of the world-famous "Gilka," or Berlin absinthe. Established 1836. Purveyor to the courts of T. M. the German Emperor and the Emperor of Austria-Hungary, T. R. H. Prince Friedrich Karl of Prussia, Prince Fried-	
3329	Crarbach Nachf. * Berlin 56 * Established 1847. Vine grower and wholesale wine dealer. Specialities: Saar, Moselle, and Rhine wines. Army contractor. Widest market in the trade.	rich Leopold of Prussia, the Grand Duke of Hessen u. bei Rhein. Awards and highest honours at all international exhibitions, among others, gold medal Moscow, gold medal Exposition Uni-	
3330	P. W. Franz Valckenberg, wholesale wine dealer, and vine grower * Worms a. Rh. * Rhine wines; "Liebfraumilch" of 1897, choice "Liebfraumilch" of 1897, "Liebfraumilch Kirchenschlüssel" of 1901 (registered trade marks). See advertisements p. 23.	verselle de Paris, and the State Prize of the Kingdom of Prussia. General agent for the whole of the United States of America, Wm. G. Moehring & Co., 151/153, Cedar Street, New York. H. C. König * Steinhagen i. Westfalen *	3338
3331	Gustav Vanvolxem * Trier a. d. Mosel * Vine grower. "Caseler Riesling" of 1895, and 1897, "Oberemmeler Riesling" of 1900.	"Steinhäger" distillery. Genuine Stein- häger of the "Steinhäger Urquell" brand. 100 medals. Sample cases of a dozen jugs to be had from Harder & de Voss of Hamburg. Sold by the glass.	
3332	Gebrüder Wagemann * Wiesbaden * Wine dealer. Purveyor of the Grand-Ducal Court of Baden. Branches in London and New York. Two medals Paris 1900. General agent for the United States, Alfred de Montebello &	Georg Scherer & Co. * Langen near Frankfurt a. M. * See grps. 93 and 94 p. 487 and 488. Whiskybrennerei von Julius Lappe. Court purveyor to H. R. H. the duke of Saxe-Coburg-Gotha * Deudietendorf	3339
3333	Co., 127, Broad Street, New York. 7. L. Wolfs Erben (Welngutsbesitzer Alfred und Otto Wolf) * Wachenheim (Rheinpfalz) * Proprietors of finest vineyards in Wachenheim, Forst, Deidesheim, and Ruppertsberg.	in Thuringen * Four leafed clover whiskey, pure fermented liquor made of malted native grain. Award at the Exposition Universelle de Paris 1900. See grp. 93 p. 487.	
3334	Otto Werren * Kreuznach a. d. Nahe * Wine dealer. Six varieties of white wine. B. Brandies.	Syrups and Liqueurs—Distilled Spirits—Commercial Alcohol.	
3335	Albert Buchholz * Grünberg i. Schl. * Branch businesses in Cologne, Munich, Leipzig, Worms, and Bingen, own distillery at Krems a. Donau. The firm	Albert Buchholz, Kognakbrennerei * Grünberg i. Schl. * Orange Brandy, Egg brandy, and "Kirschwasser." See grp. 92 p. 486.	3341
	has grown to be the largest brandy distillery in the German Empire. Its	Landauer & Macholl * Heilbronn * Established 1860. "Kirschwasser"	3342

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distillery "Zwetschgenwasser", and Bilberryspirits. Cherry brandy. Awards, Philadelphia Exhibition 1876, gold medal Frankfort a. (D. 1900, gold medal Paris 1900. Export to all countries. See advertisements p. 22.

Th. Lappe * Neudietendorf i. Th. * Proprietor: J. Lappe, dispenser. Court purveyor to H. R. H. the Duke of Saxe-Coburg-Gotha. 1. Th. Lappe's aromatic, choice bitters, prepared since 1828 in the dispensary of Th. Lappe, and his successors, the owners of the dispensary and proprietors of the firm Th. Lappe, Neudietendorf. Favorable opinions by municipal teeting office, Gotha, and by several prominent physicians, on its effect on the digestive organs. Gold medal at the Merseburg exhibition of 1865, and also various other distinctions at German exhibitions. Foreign awards, International Exhibition Sydney 1879, Porto Alegre 1881, Amsterdam 1883, Antwerp 1885, World's Fair Chicago 1893 and Paris 1900. Export to all parts of the world, principally to the United States of North America. Sole agents, Bätjer & Co., New York. 2. "Thüringer Bergtau" (Thuringian mountains dew) finest table liqueur. Awarded Paris 1900.

Isidor Mamlok * Breslau * Distillery of fine liqueurs. Established 1877. Specialities, adapted for export, and to be obtained at the Bar, Curaçao, Breslau Corn Brandy, Allasch, Alter Dessauer. Enquiries invited.

Carl Mampe * Berlin N., Veteranenstrasse 24 * Established at Köslin in 1853, continued in Berlin 1879. Specialities: "Dr. Mampe's Bitters," prepared from the secret recipe of Geh. Sanitätsrat Dr. Karl Mampe, "Half and Half," "Mampe and pomegranate." Yearly 3/4 million bottles consumed in Berlin. Awards at most exhibitions, among others the Royal Prussian State Medal.

Bommerlunder-Fabrik * Flensburg * Established 1760. Speciality: Bommerlunder table aquavitæ, distilled from corn. Many awards. Agents: Hans Jensen, Chicago, Henry Kröger & Co., New York.

Georg Scherer & Co. * Langen near Frankfurt a. Main * Cognacs, liqueurs. See grps. 92 and 94 p. 486 and 488.



H.Underberg-Albrecht *
Rheinberg am Niederrhein * Inventor and distiller of "UnderbergBoonekamp," motto: Semper idem. Purveyor to H. W. the Emperor William II., &c. Established 1846. Export to all parts of the Globe. Sole agents for North America and Canada: Luyties Brothers, New York. Awards at 25 world fairs and industry exhibitions.

Whiskybrennerei von Julius Lappe * Neudietendorf i. Th. * "Vierkleeblatt"-Whisky. See grp. 92 p. 486.

Group 94.

Fermented Beverages.

Aktienbrauerei zum Löwenbräu * München * Largest brewery in Germany. Annual sale 630,000 hl. Dark and light

export beer. Fancy beers.
Tropic proof bottled beers. Export to all parts of the Globe in casks and bottles. Preserved tropic proof seed yeast. Works: 10 Steam engines with 1,400 H.P.
MUNCHEN
Registered

Trade marke. fabrication of beer. Special malt works for an annual production of 300,000 ewt. of malt. Hands employed at average of 800. 143 special railcars. Awarded with first prizes only at all expositions exhibited at. Agents for North America: Beer in barrels: The A. H. (Never Co., Hoboken

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(Frigg)	N.Y. For beer, filled in bottles at the bewery: Jul. Wile Sons & Co., New York, 148, Douane Street. General agent for Trans Oceanic export: Ebert & Weissflog, Hamburg, 2, Alster glacis.	light Lager and Bockbeer: 360,000 hl. Export to all countries. 450 hands. Highest awards at numerous exhibitions. Stadtbrauerei Blankenhain in Thü-	3358
3351	Bürgerliches Brauhaus (Dünchen (Dünchener Bürgerbräu) * Wide spread export. Highest awards: Chicago 1893.	ringen, AktGes. * Speciality: "Malz- Kraft-Beer," sterilised according to Pasteur. See advertisements p. 20. Vereinigte Eisenacher Brauereien, Peters-	3359
3352	Paris 1900: Grand Prix. Kulmbacher Exportbrauerei "Mönchshof," Aktiengesellschaft * Kulmbach * Beer.	berger- und Schlossbrau- erei, AktGes. * Eisenach i. Th. * Spec "Wartburg- Bräu," export beer, steri-	
3353	G. Pschorr * München * Beer.	Trade Mark. Bavar. and Pilsen receipt.	- 1
3354	Gebrüder Freyeisen, By special appointment to H. R. H. the Grand Duke of Baden * Frankfurt a. (1). * Founded 1817. Cider and champagne cider. Awarded Chicago; Paris silver medal. Holder of the Royal Pruss. Staatsmedaille and	Group 95. Inedible agricultural products.	
	more than 50 other high and highest	Bernh. Bing * Nürnberg * Hops.	3360
	awards.	S. B. Bing Söhne * Nürnberg * Hops.	3361
3355	Georg Scherer & Co. * Langen b. Frank- furt a. M. * Cider. See grps. 92 and 93	Paul Reinemann * Nürnberg * Hops.	3362
1	p. 486 and 487.	Anton Sahlmann * Fürth * Hops.	3363
3356	Fabriel Sedimayr, Brauerei zum Spaten * München * Highest awards at all expositions where exhibited. Important export to all parts of the globe.	Ed. Scharren & Co. * Cannstadt * Hops. (D. Seidenberger Söhne * Nürnberg * Hops.	3364 3365
	See advertisements p. 23.	Stein & Köster * Mainz * Hops.	3366
3357	Jos. Sedlmayr, Brauerei zum Franzis- kanerkeller (Leistbräu) * München * Entire production in Lager-, Märzen,	Nahrungsmittel · Untersuchungslabora- torium, Kaiserl. Gesundheitsamt Ber- lin. See Social economy p. 494.	3367
	d) Exhibit of the German	East African Protectorate.	3
4		, 90, 95, 96, 113, 114, 116, 120, 27 and 128.	3
3370	Kaiserl. Gouvernement Daressalam * Books, agricultural products, especially hemp, cotton, coffee, pod fruit, oil producing plants, timber, rubber, useful minerals, shooting and fishing products, ivory, ethnological objects, caravan equipment.	Prof. Wilhelm Kuhnert * Berlin, Luitpoldstrasse 41 * Original paintings and sketches from German East Africa: Palla-antilopes, elephants, gnoos hyena-dogs, water buck, elands, lions, grant gazels, vulture galeany, baboons, zebras, horse antilopes. See	3374
3371	Bergbaufeld Luisenfeld, G. m. b. H. * Berlin SW. 48., Wilhelmstr. 29 * See grp. 116 p. 493.	p. 393. Kolonialwirtschaftliches Komitee* Berlin, Unter den Linden 40 * Maps and publications concerning Colonial eco-	3375
3372	Hansing & Co. * Hamburg * Vanilla from the Kilopeni plantation. See grp. 90 p. 489.	nomy. Justus Perthes * Gotha * Map of the	3376
3373	A.Krüss, Optisches Institut * Hamburg, Adolfsbrücke 7 * See grp. 16 p. 411.	German East African Protectorate. See p. 384 and grp. 18 p. 411.	

	депіси	LTURE	
3377	Dietrich Reimer (Ernst Vohsen) * Ber- lin SW., Wilhelmstr. 29 * Works and	v. Tippelskirch & Co. * Berlin * See grp. 120 p. 490.	3379
3378	maps on German East Africa. See grps. 17 and 18 p. 410 and 411. C. G. Schillings * Gürzenich-Düren * See grp. 16 p. 411.	Dr. Heinrich Traun & Söhne, vorm. Harburger Gummikamm-Co. * Hamburg * Objects made of East African galvan- ized rubber.	3380
	2. Single	Groups.	
	Group 83.	Dr. Th. Omeis, Direktor der landwirt- schaftlichen Versuchsstation * Würz-	3387
	Theory of Agriculture. Agricul- tural Statistics. See grp. 5 p. 478.	burg * Filtering stands for analytical laboratories, special construction; Nitrogen decomposing stand, special construction.	3388
	Joint Exhibition of Objects of Outfit, Apparatuses and Utensils for the Chemical Laboratory of an Agricultural Experimenting Station.	Tierphysiolog.Institut d.landwirtschaftl. Akademie * Bonn-Poppelsdorf * Dir. Prof. Dr. Oskar Hagemann, four reproductions concerning the respiration calorimeter of the Institute and the calorimeter house.	3386
	(Danagers: Dr. Salomon and Dr. Sauer, Berlin N., Chausseestr. 3.	Group 89.	
3381	Vereinigte Fabriken für Laboratoriums- bedarf, Ges. m. b.H. * Berlin N., Chaussee-	Preserved Meat, Fish, Vegetables and Fruit.	
	strasse 3 * Founded by the following firms: Max Kaehler & Martini and Dr. Peters & Rost. Sole agency in U.S.A. and Canada: Laboratory and School Supply Co. Ltd., New York. See grps. 19, 23 and 140 p. 365 to 368, 371 to 373, 425, 426 and 498.	Carl Bödiker & Co., Internationale Schiffs- bedarf-Gesellschaft, Bremen * Bremer- haven, Geestemünde, Tientsin, Tsingtau, Swakopmund * Speciality: Equipments of expeditions, ships, troops. See grp. 8 p. 389.	3389
3382	Agrikulturchemische Versuchsstation der Landwirtschaftskammer für die	Group 90.	
	Provinz Brandenburg * Dahme (Mark) * Three small volumes of publications and four photographic reproductions.	Sugar and Confectionery-Condiments and Relishes.	
3383	Kgl. Sächsische Landwirtschaftliche Versuchsstation zu Möckern, in Gemein-	Hansing & Co. * Hamburg * Vanilla from the plantation Kilopeni.	3390
	schaft mit Franz Hugershoff * Leipsic * Model of a Pettenkofer respiration apparatus. Calorimeter and shell, system Langbein-Hugershoff.	Group 97. Horses.	
3384	Kgl.Landwirtschaftl.HochschulezuBerlin (Prof. Zuntz) * Respiration apparatus.	See special catalogue. 1. Verband der Pferdezüchter in den	3391
338 5	LandwirtschaftlicheVersuchsstationHll- desheim * Rotating apparatus for de- termining phosphoric acid solvent in citric acid, in Thomas meals, system Prof. Dr. Karl (Düller.	Holsteinischen Marschen, e. G. m. b. H., (Sektion der Landwirtschaftskammer für die Provinz Schleswig-Holstein) Sommerlander Riep. 2. Verband der Züchter des Olden-	3392
3386	Landwirtschaftliche Versuchsstation der Landwirtschaftskammer für den Re- gierungsbezirk Kassel * Marburg a. Lahn * Precision adjusting balance, ba- rometer, toluol bath, &c.	burger eleganten schweren Kutsch- pferdes * Rodenkirchen i. Oldenburg. 3. Landwirtschaftlicher Hauptvereinfür Ostfriesland * Norden * The studbook of Ostfriesland.	3393
	48	39	

Forestry, Fish	ery and Game. nd Game Building.)	
of the Royal Prussian Fisc Manager: Oberforstmeis Artistic arrangement: Arth	ster Riebel, Eberswalde. ur Schulz, sculptor, Berlin.	
Groups 112, 113, 120 and 121. Kgl. Preuss. Staatsforstverwaltung * Particulars in special catalogue. Aktiengesellschaft H.F. Eckert * Berlin- Friedrichsberg * Branch at Bromberg. Factory of agricultural machines. Ploughs	tion and forestry work. Particulars in special catalogue. Patronenhülsenfabrik Bischweiler. Walbinger, Meuschel & Co. * Bischweiler im Elsass * Manufacture of shooting and revolver cartridges, Flobert Munition and gun wads. See advertisements p. 7.	3415
for forest culture; plough models. Otto Bock, Purveyor to H. (D. the Emperor and King * Berlin W., Kronenstr. 7 * Antlers (Guns, taxidermy, hunting,	Pommersche Eisengiesserei u. Maschl- nenfabrik * Stralsund * Drilling machine for forest culture, system Spitzenberg.	3416
&c., requirements. Friedrich Brüggemann * Hannover * Objects of exhibition. See grp. 74 p. 474.	Remscheider Sägen- u. Werkzeugfabrik J. D. Dominicus & Söhne * Remscheid- Vieringhausen * Saws and tools for forestry.	3417
F. Duensing, Maschinenfabrik * Fürsten- walde (Spree) * Plough wheel for pre- paring soil for pines, constructed by the Royal Pruss. Forester Spitzenberg.	Wilhelm Spoerhase, vorm. C. Staudinger & Co. * Giessen * Factory for Precision balances and weights, forest measuring instruments. See p. 374 and gr. 19 p. 415.	3418
J.C. Hartung * Mühlhausen i. Th. * Inventor and manufacturer of the cross steel hand borer, the deep soil and cartridge borer. German, Engl. and American Patent. Haynauer Raubtierfallenfabrik E. Grell & Co. * Haynau i. Schl. * Traps for wild beasts and birds, throwing machines for clay pigeons; animals. T. Hensoldt & Söhne * Wetzlar * Prism	v. Tippelskirch & Co. * Berlin * Outfitters for the Tropics (special factory). Agencies at Swakopmund (German South West Africa) and Tsingtau (German China). Purveyors to the Imperial Foreign Office, the headquarters of the Imperial Colonial troops and central committee of the German Red Cross. See Agriculture p. 489.	3419
telescope, prism aiming telescopes, distance measures, terrestrial telescopes. Single parts of optical instruments. P.W. Hermans * Prummern, Rheinland * Schreiner. Beetle traps for destroying harmful insects on pasture ground.	R. Weber, Raubtierfallenfabrik * Hay- nau i. Schl. * Swan throat, flat, traps, vulture irons, spring-gun, slings, trap models, stuffed animals, game- -call.	3420
NIcol. Kissling * Vegesack b. Bremen * China plates for use in gardening, agriculture and forestry.	Single Exhibitors. Group 121.	
Kgl. Preuss. Forstakademie Eberswalde* Scientific works. Reproductions from forestry instruction and forestry work. Particulars in special catalogue. Hgl. Preuss. Forstakademie Wünden * Reproductions from forestry instruc-	Products of Hunting. Carl Hagenbeck, Tierpark * Stellingen near Hamburg * Purveyor of animals of all kinds for Zoolog. Gardens, parks, &c. Animals paradise, North pole panorama, Zoological Circus on the Pike.	3421

Department L. Output	
1. Joint Exhibitions embracing several groups. Exhibit of the Kgl. Preussisches Ministerium für Handel und Gewerbe. Groups 115, 117, 119, 136, 138, and 139	
Group 115. more machines and apparatuses for keeping the lamps in order. Drägerwerk Lübeck * Fabrication of oxygen for inhaling, live saving of the aphixiated, breathing in poisonous air. Narcotising apparatus.	3434
Kgl. Preuss. Bergwerksdirektion in Saarbrücken * 6 drawings of the new mining school building at St. Johann-Saarbrücken. See grps. 136, 138 and 139 p. 492 and 493. Kgl. Preuss. Geolog. Landesanstalt und	
Bergakademie * Berlin N. 4, Invaliden- str. 44 * Arrangements and methods of promoting mining. Bergwerksgesenschaft Albertia * nettle (Westfalen) * Model of surface plant at Shamrock colliery, pits 111 and 10. Photograph stand and photographs.	3435
Friemann & Wolf * Zwickau i. S. * Gelsenkirchener Bergwerks-Aktien-Ge- Machines and safety mining lamps. Awarded 2 State, 4 gold, 10 silver and bronze medals, and 4 diplomas of face plants. Gelsenkirchener Bergwerks-Aktien-Ge-sellschaft * Gelsenkirchen * Photographic * Gelsenkirchen * Photographic * Gelsenkirchener Bergwerks-Aktien-Ge-sellschaft * Gelsenkirchener Bergwerks-Be	3436
honour, at the Worlds Fair 1900 the first prize for safety mining lamps, "gold medal." Besides, Herr Carl Wolf sen. received for his improvements in safety lamps the Rote Adlerorden 4. Klasse from H. J. (D.	3437
Haiser Wilhelm II. and the Ritterkreuz des Albrechtordens from H. (I). King Bergakademie * Berlin * Geological Mibert of Saxony. The firm was established in 1863. Branches: Waldenburg (Silesia) and Liége (Belgium).	3438
2 steam engines with 40 H.P. each and 3 dynamos with 14 resp. 3 H.P. Maps and wall charts of the northare at work. In 1903 there were 425 hands besides 36 officials. The districts.	3439
annual output is about 60,000 safety mining lamps. Export to all parts of the globe. Exhibits: a collection of Wolf safety mining lamps and other with the collection of the work with the collection of the work with the collection of the collectio	3440
systems of safety lamps with the Westfälische Berggewerkschaftskasse * necessary spare gear and tools, further- Bochum * Mining aid funds, mainte-	3441

TIMES AND THETALLURGY

Kal.Preuss.Berginspektion * Stassfurt * 3450 nance of mining schools and mining preparatory schools laboratories, fire Four photographic representations of damp experimental station, boundry workmen's colony near the Berlepsch marking, publication of maps, station mine. for testing ropes, dito for testing anemo-Kgl. Preuss. Bergwerksdirektion *Saar-3451 meters, geological investigation of coal brücken * Workmen's provident institumountains, building of canals and hospitals. Model of the lower Rhine tions at the fiscal coal mines near the Saar river. See grps 115, 138 and 139 and Westphalian (Ruhr) coal district p. 491-493. in a ground plan and 38 sections painted on glass, scale 1:10,000. Group 138. Group 119. General Betterment Movements. Literature of Mining. Fürstliche Bergwerksdirektion * Wal-3452 denburg (Schlesien) * Pamphlet. Social Metallurgy, &c. welfare institutions of the Fürstenstein Grossh. Badische Geologische Landes. mines. Proprietor: H. H. Prince of Pless. anstalt * Heidelberg * Geological maps Gelsenkirchener Bergwerksaktiengesell-3453 with explanations and publications of schaft * Gelsenkirchen * Drawing of the Geologische Landesanstalt. social welfare building of the united grp. 117 p. 491. Stein and Hardenberg collery. See Kgl. Preuss. Geolog. Landesanstalt und grp. 117 and 136 p. 491 and 492. Bergakademie * Berlin * Geological Oberschlesischer Knappschaftsverein * 3454 maps with explanations, essays, an-Tarnowitz * 4 pictures of hospitals of nuals, reliefs and boring tools. See the Oberschlesische Knappschaftsverein. grp. 117 p. 491. See gr. 139 p. 493. Kgl. Sächs. Bergakademie * Freiberg Bergbaugesellschaft "Neu-Essen" 3455 (Sachsen) * 200 printed copies of a Essen (Ruhr) * Architectural drawing essay on Saxony's mining and metalof a gang's cabin near the Fritz pit, lurgy. See p. 364. built in 1901. Verein für die bergbaulichen Interessen, Göhmann & Einhorn, G.m.b.H.* Brüssel. 3456 Sitz Essen a. Ruhr * Established 1858. Kattowitz, Dresden, Dortmund * Draw-Comprising as members 103 mines with ings of washing sheds and bathing an output of about 64 million tons places for colleries and factories. annually. About 260,000 men. Exhibit: various new publications. See Kgl. Preuss. Bergwerksdirektion * Saar-3457 grp. 117 p. 491. brücken * Memorandum on the Social welfare institutions for the benefit of Group 135. the workmen in the district of the Royal Mining Direction Saarbrücken. Benevo-Provident Institutions. lentinstitutions, shewn on the seam map. Allgemeiner Knappschafts-Verein See grp. 115, 136 and 139 p. 491-493. Bochum * Intended to aid the members Kgl. Preuss. Oberbergamt * Breslau * 3458 and their families. Its developement Workmen's benevolent institutions in and aim in graphic and numerical rethe Upper Silesia industry district. Alpresentation. Consumption sanatorium bum with heliographic illustrations. at Beringhausen. See grp. 139 p. 493. See grp. 117 p. 491. Saarbrücker Knappschaftsverein, Kran-Friedrich Krupp, Aktiengesellschaft 🔺 3459 ken- und Pensionskasse * Graphic re-Essen a. Ruhr * Social welfare institupresentation of chief results from 1860 tions. to 1902 incl. on 4 tables. Oberschlesischer Berg- und Hütten-3460 männischer Verein * Kattowitz * Work-Group 136. men's benevolent institutions in the Housing of the working classes. Upper Silesia industry district. Album with heliographic illustrations. Bochumer Verein * Bochum * Drawings, 3461 Verein zur Förderung des Wohls der photographs and models of workmen's arbeitenden Klassen im Kreise Waldendwellings. Seep. 361 and grp. 118 p. 494.

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burg i. Schlesien, eingetragener Verein

* Waldenburg, Silesia * Festal report

of the celebration of the 25 year of the

union's existence.

GelsenkirchnerBergwerks-Aktiengesell-

schaft * Gelsenkirchen * Models of workmen's colony. See grp. 117 and

138 p. 491 and 492.

mines and metallurgy

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	Group 139. Charities and Correction.	Hgl. Preuss. Bergwerksdirektion * Saar- brücken * Building plans of hospital for miners at Holz. See grps. 115, 136	346
3462	Allgemeiner Knappschaftsverein * Bochum * Coloured perspective views of consumption sanatorium at Beringhausen near Meschede. See grp. 135 p. 492.	and 138 p. 491 and 492. Oberschlesischer Knappschaftsverein * Tarnowitz * 4 views of hospitals of the Oberschlesische Knappschaftsvereins. See grp. 138 p. 492.	346
	2. Single	Groups.	
	Group 115.	products representing by illustrations and text "Perkiewicz's Process." The	
	Working of Mines, Ore beds and stone quarries.	production of pure burned colours or kiln wares without the use of colours	
3465	Kgl. Porzellan · Manufaktur * Berlin * Apparatuses for chemical and technical use. See grp. 45 p. 464.	or Engobe colouring clays. Is employed even after the ten times more costly baryte process (addition of carbonate of baryte) has failed. Theoretically and	
	Group 116.	practically tested. Perfect solution of this hitherts undecided question in	
	Minerals and stones, and their utilisation.	ceramics. German patent 130,413. German patent applied for. American	
3466	Aktiengesellschaft Norddeutsche Steingutfabrik * Grohn-Vegesack near Bremen * Glazed earthenware tiles. See grp. 45 p. 463.	patent 740,040. Patented in all civilised countries. Own works. Annual output 14 million pieces of claywork. Mining Building. See grp. 45 p. 465.	
3467	Sustav Bähr, Baumeister * Charlotten- burg, Bleibtreustr. 54 * Tile press for making smooth and ornamental tiles	See advertisements p. 16. Tonwerk Schippach bei Klingenberg a. (Dain (Bayern) * Export of fine clays for crucibles and smelting pots. Clays	347
3468	and corners. See grp. 45 p. 463. Bergbaufeld, Luisenfeld, G. m. b. H. * Berlin, Wilhelmstr. 29 * Jewelry, uncut and cut garnets from Luisenfelde, Lindi Hinterland, German East Africa. See	for metallurgy and crucibles. Joh. Ph. Wild * Idar * Heart shaped Brazilian Topas, facetted at the bottom and ground convex at the top. (Art Industry Palace.)	34
3468a	Agricultural Building p. 488. Amber Exhibition * See Art Industry Palace p. 431.	J. Zinndorf * Baumbach (Westerwald) * Self made dressed stones, whet stones	34
3469	Cordes & Co. * Hannover, Deutschland * Corde's "Leichtstein" German patent No. 134,948. American, Canadian and 16 foreign patents. German Architecture Exhibition. Prize of honour of the town of Dresden. Hannover 1903: First prize, Gold medal. 64 licensed factories in Germany with annual output of over	and grindstones. Exhibition of Watering Places. (Liberal Arts Building.) Königlich Preussische Domänenverwaltung * Berlin * Baths and Mineral springs. Ems: Carbonic acid alcalic thermes: Kränchen, Kaiser, Kassel and Viktoria springs. Drinking cure, car-	347
	30 millions. Corde's "Leichtstein" is exceptionally light, amazingly hard, absolutely fireproof, sound diminishing, proved to be a good isolater and very	bonic acid thermal mineral baths, in- halatoria (Levin, Schnitzler, Bulling). Gurgling apparatuses, loxenges, spring salts. Langenschwalbach, earth alcalic	
3470	cheap. Patent for sale. See grp. 25 p. 427. Wathildenhütte, Flusspatverkaufsverein * Harzburg * Fluorite for chemical purposes, glass factories, iron founderies, enamelling and steel works and	iron acidulous waters, drinking and bathing cure, new carbonic acid bath. Schlangenbad: "Wildbad" Thermal drinking and bathing springs. Nenndorf: Brine and sulphur springs.	
3471	cement factories. Neue Tonwerke, Aug. Gundlach & Co. * Grossalmerode * Various sorts of clay	Drinking and bathing cure, central and separate inhalation. New sulphur mud bath. Norderney: German Ocean is	
3472	for glass crucible purposes. (17). Perkiewicz, Conwerke Ludwigsberg bei Moschin * Table of natural	land watering place, cold and warm sea baths, central water works, flushing canalisation.	

MINES AND METALLURGY

3477	Ministerium des Innern * Karlsruhe * award Chicago 1893; Diploma 1902. Chief Office: Rosbach 1902. Chief Office: Rosbach Waterloo Bridge, London. Ne weiler. Diorama of Baden-Baden. Hot Springs 63-9° C.	Wharf, w York: al water
3478	Bad-Nauhelm * Grossh. Hess. Staats- bad. Near Frankfort-on-the-Maine. Three warm carbonic acid brine springs, 7 bath houses, 277 seperate bath cells. 1903: 23.931 patients, 331.027 baths	iquellen, 3483 al water
	for heart ailments, gout, rheumatism, diseases of the nerves and women's Metallurgy.	
3479	Kais. Gesundheitsamt * Berlin * Wall diagram and pamphlet concerning German sanatory springs and baths. Bochumer Verein für Bergbau ut stahlfabrikation * Bochum * cast steel Bells in the German Building. See p. 361 and grp. 13	Chime of state
3480	Natural Mineral Waters. (Agriculture Building.) Aktiengesellschaft Apollinarisbrunnen Aug. Gundlach * Grossalmerog nufacture of graphite melting of every shape and size for melt of the state of the	te * Mar 3485 crucibles ing gold,
	alkaline mineral water bottled at the Appollinaris Spring at Neuenahr, Rhenish Prussia, Germany. The exhibi-	lew pro-
	exporters are the Apollinaris Co. Emtd., 4, Stratford Place. Oxford Street, London W. Agents: The United Agency Co., 503, Fifth Ave. New York. The Appollinaris Spring was discovered in 1851 Alfred Gutmann, Aktiengesellse Waschinenbau * Ottensen-Hair Rotary blast No. 8. Gas suctions No. 4. Various moulds and discovered in 1851	nburg * machine cawings. and 471.
	in consequence of the exhalations of carbonic acid in the neighbourhood. Appollinaris has long commended itself Group 119.	□ □
	to the medical profession and to the public. The annual sale of this water which amounted in 1873 to one million and eighteen million bottles in 1893 has now increased to thirty million bottles and jugs. Literature of mining, metally Willer & Schmidt * Coburg * Pu Office of the "Sprechsaal," Journal of the most in the most in the company of the com	blishing 3487 arnal for dustries.
3481 3482	Bad Bertrich * Mineral waters. Rosbacher natürliches Mineraltafelwasser * Springs near Homburg * High unions of the ceramic and quatry in Germany and Austria-I Established 1868. Gold medals I 1888. 12 selected years.	lungary.
	Department O.	
	Social Economy. Education Building. Model City.	10
	1. Joint Exhibition,	
	comprising several groups.	
	a) German Hygiene Exhibition.	
	Management: Kaiserliches Gesundheitsamt, Berlin NW., Klopstockst Artistic Arrangement: Architekt Bruno Möhring, Berlin. (See separate Catalogue of the Hygiene Exhibition as well as the Joint Exfor the combating of diseases.)	

Crown 1	P	
Group 1. Elementary Education.	Charities and Correction.	
See Education p. 381.	Kaiserliches Gesundheitsamt * Berlin * Wap of the German Sanatoria for con-	3498
Instruments of Precision, physical apparatus, &c.—Coins and medals. See Liberal Arts p. 412.	sumption. Barmer Verein für Gemeinwohl * a) Sanatorium for anemic and chlorosic persons at Godesberg. b) Removal of sick and convalescent.	3499
Group 20. Medicine and Surgery. See Liberal Arts p. 416.	Magistrat der Haupt- und Residenzstadt Berlin * Perspective representation of the Rudolf Virchow Hospital. Rat der Stadt Leipzig * Model and plans	3500 3501
Group 23. Chemical and Pharmaceutical Arts. See Liberal Arts p. 417.	of the Dösen Sanatorium. Orphanage. The German Hospitals for Consumptives, in connection with the Kais. Gesundheitsamt.	
Group 26.	A. Public Hospitals for Consumptives.	
Models, plans and designs for public works. See Liberal Arts p. 427.	Krels Altena 1. W. * Plans of the National Hospital for the District of Altena, Lüdenscheid i. W.	3502
Group 71. Various applications of Electricity. See Electricity p. 472.	Badische Anilin. und Sodafabrik * Lud- wigshafen a. Rh. * Plans of the Dannen- fels Sanatorium near Kirchheimbo- landen.	3503
Group 83.	Bergische Volksheilstätten für hellbare Lungenkranke, G. m. b. H. * Plans of the Berg Sanatorium for the People, Ronsdorf.	3504
Theory of Agriculture—Agricultural Statistics. See Agriculture p. 476.	Magistrat der Königlichen Haupt- und Residenzstadt Berlin * Plans of the Home for Consumptive men, Buch.	3505
Group 116.	Berlin-Brandenburger Heilstättenverein * Plans of the Belzig Sanatorium.	3506
Minerals and stones, and their utilization. Bäder-Ausstellung. See p. 493.	Cölner Heilstättenverein * Plans of the Cologne Town Hospital "Auguste-Victoria," Sanatorium for the People, Rosbach a. d. Sieg.	3507
Group 136. Housing of the working classes.	Deutsche Heilstätte in Davos bel Wolfgang in Graubünden (Schweiz) * Plans of the Sanatorium.	3508
Bürgermeisteramt der Hauptstadt Wannheim * Building plan of zones. Statistisches Amt der Stadt Dresden *	Frankfurter Rekonvaleszentenvereln * Plans of the Ruppertshain Sanatorium. Ruppertshain in the Taunus, Mountains.	3509
Representation of a comparison of the housing conditions in various towns.	Stadtmagistrat Fürth * Plans of the Fürth Sanatorium.	3510
Group 137. The Liquor Question.	Heilstättenverein für den Reglerungs- bezirk Minden * Plans of Auguste-Vic- toria Institution. Public Sanatoria I and 2 for Lippspringe.	3511
Kals. Gesundheltsamt * Berlin * Publication concerning alcohol. Published by Julius Springer, Berlin N.	Hellstättenverein Nürnberg * Plans of the Engelthal Sanatorium near Hers- bruck.	3512

3513	Hellstättenverein für Lungenkranke im	Ortskrankenkasse Stuttgart * Plan of	3528
	Regierungsbezirk Oppeln * Plans of the Loslau Public Sanatorium in Upper Silesia.	Convalescent Home in Neustädtle. Patriotisches Institut der Frauenvereine für das Grossherzogtum Sachsen *	3529
3514	Invalidenversicherungsanstalt Hessen * Plans of the Ernst Ludwig Sanatorium near Sandbach im Odenwald.	Plans of Sophia Sanatorium near Berka on the Ilm.	7570
3515	Johanniterorden * Plans of the Johanniter Sanatorium for Consumptives, Sorge, Harz Mountains.	Pensionskasse für die Arbeiter der Preusslsch-Hessischen Eisenbahngemeinschaft * Plans of the Stadtwald and Moltkefels Sanatoria.	3530
3516 3517	Kuratorium der Heilstätte Edmunds- thal * Plans of the Edmundsthal Sana- torium, Geesthacht near Hamburg.	Provinzialverband der Vaterländischen Frauenvereine der Provinz Sachsen * Plans of the Vogelsang Woman's Sanatorium for Consumptives.	3531
3518	Landesversicherungsanstalt Baden * Plans of the Friedrichsheim Sanatorium.	Rathenower Lungenheilstättenverein (E. V.) * Plans of the Rathenow Sana-	3532
3316	Landesversicherungsanstalt Branden- burg * Plans of the Men's Convalescent home with Opportunities for work,	torium for Consumption. Kreis Saarbrücken * Plans of the Son-	3533
3519	Hohenelse, near Rheinsberg.	nenberg Sanatorium near Saarbrücken. Sanltätsverband für München und Um-	3534
2019	Landesversicherungsanstalt Braun- schweig * Plans of Sanatoria Albrechts- haus and Marienheim in the Forest district of Moorthaler near Stiege, Harz	gebung (anerkannter Verein) * Plans of the Oberölkofen Convalescent Home near Grafing, Upper Bavaria.	
3520	Mountains. Landesversicherungsanstalt der Hansestädte * Lübeck * Plans of the Oder-	Thüringische Landesversicherungsan- stalt * Plans of the Sanatorium for Con- sumptive women, Römhild, Thuringia.	3535
	berg and Glückauf Sanatoria near St. Andreasberg, Harz Mountains and the Convalescent Home, Gross-Hansdorf	Uaterländischer Frauenverein (Sektion VII) zu Kassel * Plans of the Oberkaufungen Sanatorium near Cassel.	3536
	near Hamburg and Westerland on the Island of Sylt, with Pamphlet: "The Co-operation of the National Insurance Institute of the Hanseatic towns in the	Verband zur Errichtung von Volksheil- stätten für Lungenkranke im Regierungs- bezirk Coblenz * Plans of the Public Sanatorium in Waldbreitbach near Neuwied.	3537
	combating of Consumption with a description of the Institutions erected for this purpose. Sanatoria Convalescent Homes and Homes for the disabled."	Verein zur Begründung von Volksheil- stätten im Königreiche Sachsen * Plans of the Albertsberg and Carolagrün Pu- blic Sanatoria near Reiboldsgrün i. V.	3538
3521	Landesversicherungsanstalt Elsass- Lothringen * Plans of the Leopoldinen- heim Sanatorium near Altweier.	Verein zur Gründung eines Sanatoriums für unbemittelte Lungenkranke in Unter- franken * Plans of the "Luitpoldheim"	3539
3522	Plans of the Crown Prince Wilhelm's Public Sanatorium near Obornik.	Sanatorium near Lohr, Spessart. Verein zum Heinrich-Hospital * Plans	3540
3523	Märklscher Volkshellstättenverband * Plans of the Märkische Public Sana- torium, Ambrock near Hagen i. W.	of the Heinrich's Hospital Arlen. Verein für Volksheilstätten in Oberbayern * Plans of the Planegg-Krailling	3541
3524	Magdeburger Verein zur Bekämpfung der Lungenschwindsucht * Plans of the Sanatorium for Lung Disease, Lostau.	Public Sanatorium. Verein für Volksheilstätten in der Pfalz (E. V.) * Plans of the Public Sanatorium	3542
3525	Stadtgemeinde Wünchen * Plans of the Town Sanatorium of Harlaching near Wunich.	for Consumptive Men Albersweiler. Verein für Volksheilstätten in Württemberg * Plans of the Public Wilhelmsheim Sanatorium.	3543
3526	Nassauischer Heilstättenverein für Lungenkranke * Plans of the Nassau Sanatorium for Consumptives, Naurod.	Volkshellstättenverein vom Roten Kreuz * Plans of the Red Cross Public Sana-	3544
3527	Norddeutsche Knappschaftspensions- kasse in Halle a.S. * Plans of the Miners Sanatorium Sülzhayn, Harz Mountains.	torium, Grabowsee near Oranienburg. Krels Wittlich* Plans of the Grünewald Sanatorium for Consumptives near Wittlich.	3545

j			
	B. Private Sanatoria for Con- sumptives.	Magistrat der Haupt- und Residenzstadt Berlin * Illustrations of disinfectants.	3558
546	Aktiengesellschaft Falkenstein in Frank- furt a. M. * Plans of the Falkenstein Sanatorium, Taunus Mountains.	Plan of the Disinfectory. Rules of the Service. Apparatus. Dr. W. Beukemann * Hamburg * Illus-	3559
547	Dr. Friedmanns Erben * Plans of the Blankenhain Sanatorium for Throat	trations of the Town Milk Supply in the German Empire.	
548	and Breast Diseases. Dr. Hettinger * Plans for the Nordrach	Magistrat der Stadt Cöln a. Rh. * Plans of the Shambles and Cattle market.	3560
J40	Sanatorium for Consumptives in the Black Forest, Baden.	Models of the Slaughter house for pigs, refrigerating house, and the cattle slaughter house.	
549	Dr. Kremser * Plans of the Sülzhayn Sanatorium for Consumptives, near Ellrich, Harz Mountains.	Rat der Haupt- und Residenzstadt Dresden * Flayers Yard: a) Model, b)	3561
550	Dr. G. Liebe * Plans of the "Waldhof- Elgershausen" Sanatorium for Con-	Photographs, c) Tables illustrating the process, d) Products. Rietschel & Henneberg * Berlin-Dresden	3562
551	sumptives, near Wetzlar. Neue Heilanstalt für Lungenkranke Schömberg, G. m. b. H. * Plans of the	* Factory for hygienic technical appara- tuses. Transportable steriliser for table water.	
	New Schömberg Sanatorium for Consumptives (Oberamt Neuenburg).	Julius Springer * Berlin * Publisher and Bookseller. Complete Publications	3563
5552	Sanatorium Wehrawald, G. m. b. H. * Plans of the Wehrawald Sanatorium in the Black Forest, South Baden.	of the Kais. Gesundheitsamt. Statistisches Amt der Stadt Dresden * Illustrations of the Meat and Milk	3564
553	Dr. Sander und Dr. Waler * Plans of the St. Blasien Sanatorium, Black Fo-	Supply. Hygienic Statistics and Climatic conditions of German Towns. Verlag von Wilhelm Ernst & Sohn *	3565
3554	rest, Baden. Süddeutsche Heilanstalt für Lungen- kranke Schömberg, G. m. b. H. * Plans	Berlin * The Building of the Kais. Gesundheitsamt in Berlin. By J. Hückels. A Print.	
	of the Schömberg South German Sana- torium (Oberamt Neuenburg).	Georg Haertel* Breslau, nur Albrechtstr. * Flügge's formaline dihydrate evapo-	3 565a
3555	Dr. Weicker * Plans of the Sanatoria for Consumptives Görbersdorf, "Kran- kenheim" Public Sanatorium and "Ma-	ration apparatus for the disinfection of dwellings. Model of the Breslau Hy- gienic Institute.	
3556	rienhaus" Central. Dr. E. Wolff, Kgl. Hofrat, und Prof. Dr. R. Fleischer * Plans of the Reibolds-	Untersuchungslaboratorium für Nah- rungsmittel (Landwirtschaftsgebäude), shown by the Kaiserliches Gesundheits- amtBerlin, and the Committee for the Ger-	3566
	grün Sanatorium for Consumptives, Vogtland.	man Nahrungsmittelausstellung at St. Louis * Frankfurt a. (1). * and the Firm	
	Group 140.	E. A. Lentz * Berlin N., Gr. Hamburger Str. 2 * Factory for the equipment of Chemical, Pharmaceutical and Bacte-	3567
	Public Health.	riological Laboratoria, Chemical Works and Works for the making of Mineral	
3557	Kaiserliches Gesundheitsamt * Berlin * a) 4 Paintings of the Kais. Gesund-	waters, with the collaboration of the following Exhibitors:	
	heitsamt, b) Works from the Kais. Gesundheitsamt on Tuberculosis, &c.,	Chemisches Untersuchungsamt des Kgl. PolizeipräsidiumsBerlin (Dr. Juckenack) * Instructions and Apparatuses for the	3568
	c) Memorial on the Utility of the Vacci- nation Law, d) Meat Inspection Law, e) Little Book on Health, f) Reports on Medical Statistics, g) Annuals on the spread of disease among animals	control of food by the police. Hartmann & Braun, Aktiengesellschaft *Frankfurt a. MBockenheim * Apparatuses for electric resistance measure-	3569
	in the German Empire, h) Plastic and Graphic illustrations as aids to a Critical judgement of the state of health in the German Empire.	ment. W. C. Heraeus * Hanau a. M. * Founded 1851. Chicago, Medal for Merit; Paris, Grand Prix. See Groups chemistry, me-	3570

	chanics and optics. Instruments and apparatus of platina for laboratories for analytical chemistry.	Ferd. Enke, Verlagsbuchhandlung * Stuttgart * Ostertag, Manual on the inspection of meat.	3585
3571	Prof. Dr. G. von Hüfner * Tübingen * Spectro-photometer. 1 Original apparatus.	Otto Enslin, Buchhandlung * Berlin NW., Karlstr. 32 * Collection of works on the chemistry of food.	3586
3572	Kelser & Schmidt * Berlin N., Johannis- strasse 20 * Founded 1858. Electric measurement instruments, pyrometers	(17). Heinslus Nachfolger, Verlagsbuch- handlung * Leipzig * Fleischmann, Text-book on the dairy.	3587
3573	after Le Chateller. Fritz Köhler, Universitätsmechaniker * Leipzig * Physico-chemical apparatus	A. Kell, Buchhandlung u. Kommissions- verlag * Plauen i. V. * Journal for public chemistry.	3588
3574	and instruments. Königliche Porzellanmanufaktur * Ber-	J.U. Kerm, Verlagsbuchhandlung * Bres- lau * Rosen, Anatomical charts of food.	3589
3575	lin. A. Krüss, Optisches Institut * Hamburg * Proprietor Dr. Hugo Krüss. Universal	M. Krayn, Verlagsbuchhandlung * Ber- lin W. * Zipperer, The manufacture of chocolate.	3590
3576	spectral apparatus for qualitative and quantitative analysis. Otto Pressler * Leipzig * Factory for	C. W. Kreidel, Verlagsbuchhandlung * Wiesbaden * Borgmann, The analysis of wines.	3591
	scientific instruments for physics, chemistry, pharmacy, and microscopical experiments. Speciality: Apparatus for	S. Simon, Verlagsbuchhandlung * Berlin * Seubert, Text-book of the knowledge of wares.	3592
3577	ascertaining molecular weight (molecule scales) after Beckmann and apparatus after Ostwald.	Julius Springer, Verlagsbuchhandlung * Berlin * Works on food. Works and publications of the Kais. Gesundheits amt.	3593
3311	F. Sartorius * Göttingen und Rauschen- wasser * Factory for scientific precision instruments. Speciality: Scales for scientific technics.	Chr. Herm. Tauchnitz, Verlagsbuchhand- lung * Leipzig * Tschirsch-Österle, Ana- tomical atlas on food studies.	3594
3578	Franz Schmidt & Haensch, Optisch me- chanische Werkstätten * Berlin S. 42 * Polarisation apparatus after Lippich. Refractometer after Tornoe for ana-	Vandenhoeck und Ruprecht, Verlags- buchhandlung * Göttingen * Dragen- dorff, Legal chemical researches on poisons.	3595
3579	lysing beer. Schott & Genossen, Glaswerk * Jena * Manufacture of glasses for scientific and technical purposes. Jena instruments and tubes.	Fr. Vieweg & Sohn, Verlagsbuchhand- lung *Braunschweig * Stohmann, Milch; Lippmann, Different kinds of sugar; Strohmann-Kerl, Handbook of technical chemistry.	3596
3580	Vereinigte Fabriken für Laboratoriums- bedarf, Ges. m. b. H. * Berlin N., Chausseestr. 3 * Retorts and glass	Joint Exhibition for the Combating of Disease (Bacteriology and Ex-	
3581	apparatus for laboratories. Carl Zelss, Optische Werkstatt * Jena * Butter refractometer, immersible re- fractometer, laboratory microscope. Hand library of the analytical laboratory for food:	perimental Therapy), instituted by the Kais. Gesundheitsamt and the Königl. Preuss. Ministerium der gelstlichen, Unterrichts- und Medizinal- Angelegenheiten. See Education p. 378.	
3582	Joh. Ambros. Barth, Verlagsbuchhand- lung * Leipzig * Prior, The chemistry and physiology of beer. Röttger, Primer	Kalserliches Gesundheltsamt * Berlin * a) Legal regulations for the prevention and cure of leprosy, cholera, petechial	3597
3583	of the analytical laboratory for food. J. F. Bergmann, Verlagsbuchhandlung * Wiesbaden * Lehmann, Methods of practical hygienics.	fever, plague, small pox, abdominal typhus, and anthrax; b) Cuberculosis, typhus, and dysentery report; c) Model	
3584	With Engelmann, Verlagsbuchhandlung * Leipzig * Ostwald Luther, Physico- chemical measurements. Cohen, Phy- sical chemistry for medical men.	of the gas generator apparatus for the destruction of rats on ships; d) Microphotogram of the plague bacillus; e) Wall charts. The embryonic development of protozoen; f) micro-photographs of the	

SOCIAL ECOI	nomy	
Hæmoglobinury of cattle (Texas fever); Fir g) photographs of tetralogical growth lab of bacteria; h) illustration of the decrease log in mortality*); i) plastic and graphic ter	& M. Lautenschläger * Berlin N. 24 * rst special factory for hospital and boratory fittings, sterilisers, bacteriogical apparatuses. Model of a bacteriological laboratory, transportable phus laboratory.	3607
as a cause of incapacity for work on part of the recipients of invalid pensions; for	Leltz * Berlin * 1 microscope, stand A. r all purposes of bacteriological re- arch. 1 lense microscope.	3608
the lungs and inflammations of the respiratory organs; m) 18 diagrams con-	permedizinalrat Dr. Lorenz * Darmadt * The method used in the Grand achy of Hesse to suppress swine fever.	3609
European States; n) diagram concerning the spread of cholera in Hamburg 1892; o) plastic representation concerning small pox, diphtheria and childrens we	rbwerke vorm. Melster Lucius & uning * Höchst a. M. * Sero-thera- utic and bacteria preparations as all as illustrations of places where by were made.	3610
drophobia among dogs; q) diagram concerning glanders among horses. Knappschaftsvereln Bochum * Bochum * Publication regarding vermination. Prof. Dr. Hermann Dürck * München * Preparations concerning the Plague, preserved in their natural colours. Illustrations in reference to the Plague, leprosy and small-pox. Dr. Karl Enoch, Serumlaboratorlum "Ruete Enoch" * Hamburg * Diphtheria, Erysipelas, Antistreptococs, Antistaphylococ serum, tuberculine. Prof. Frosch, Lelter des bakterlologischen Untersuchungsamtes * Trier * Modern principles for combating Typhus (pamphlet). W. Gans, Pharmazeutisches Institut * Frankfurt a. M. * Serum against swine fever, septic pneumonia of calves, per	Merck, Chemische Fabrik und bakte- plogisches Laboratorium * Darmstadt Branches in Moscow and London; erck & Co., New York and St. Louis. I chemicals required in medicinal armaceutical use, especially alkaloids d glucosides as well as the following ecial preparations: bromipine, dio- ne, jodopine, styptizine-tannoform, pacolaine, veronal, 30 per cent pure drogen peroxide, further highly effi- ent diphtheria curative serum, strepto- c sesrum, pneumococ serum, anthrax rum, thyreoid serum, jequiritol and quiritol serum; all reagent tests for edicinal, pharmaceutical and technical reposes; chemical preparations for croscopical, bacteriological and pho- graphical use as well as preparations e producing incandescent gas light, eparations for the textile, firework, rfumery, zymological and similar	3611
Rud. A. Hartmann * Berlin S., Gitschiner Strasse 65 * Maschinenfabrik, Eisen- u. Metallgiesserei. Spec.: Apparatuses for the destruction and commercial util- isation of all kinds of animal remains. Hellsberg (Ostpreussen) * Serum Insti- tute. Swine fever serum and pure cultures of erysipelas. Staatliches Hygienisches Institut Ham- burg * Illustrations and preparations	dustries. Idewils' Fabriken Augsburg G.m.b.H. Ichfolger v. Podewlls' Fäkalienextrakt- Ichfolger v. Podewlls' Fakalienextrakt- Ichfolger v. Podewlls' Fäkalienextrakt- Ichfolger v. Podewlls' Fäkalie	3612
chitis according to Prof. Dunbar. The dizinal abtellung des Kgl. Preussischen Kriegsministerlums * Berlin * lilustration of the spread of abdominal tunbus in European armies	etschelaHenneberg * Berlin-Dresden * ctory fortechnical hygienic appliances. eciality: Sterilisers for sterilising ex- ctoration, fecal matter, expectorating sks, bed pans, bandages, &c.	3613
U).	Schanze, Felnmechaniker * Leipzig * crotom, model B30 with 3 knives and	3614

p. 379 and 415.

Microtom, model B 30 with 3 knives and 1 knive holder. See grps. 19 and 74

*) For statistical tables see grp. 140. Statistics regarding duration of life, births and deaths.

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Chemische Fabrik auf Aktien (vorm. E. Schering) * Berlin N. * Founded 1854



by E. Schering, Limited Co. since 1871. Employs about 750 workmen and a staff of 125 persons in 2 large establishments. — Wares required in

Medicine, Pharmacy, Photography and Technical Industries manufactured in purest quality Awards at all important Expositions. The factory also supplies especially durable photographic Paper. Antistreptococ serum, tested by government for the efficacious combating of all illnesses caused by streptococs, for instance, scarlet fever, puerperal fever, rheumatism in the joints. Diphtheria curative serum, highly efficient, tested by the Government. Utensils for disinfecting with formaline gas, patented in all countries and awarded numerous prizes, for the disinfection of rooms without removing the furniture and fittings.

Oskar Schimmel & Co., A.-G. * Chemnitz * Maschinenfabrik. Founded 1861. 600 workmen. Appliances for steam, washing and disinfection establishments according to own method.

W. & H. Seibert, Optisches Institut * Wetzlar and Berlin * Factory of optical instruments of precision, special microscopes for bacteriologists, mineralogical and other purposes. Exhibits: 1 large microscope for bacteriology with 2 oculars and 3 objectives.

Serumgesellschaft m. b. H. * Berlin-Eandsberg a. W. * Septizidine for swine fever and hog cholera.

Tierärztliche Abteilung des kgl. Württembergischen Medizinalkollegiums * Stuttgart * Process for the suppression of swine fever.

Carl Zeiss, Optische Werkstätte * Jena * 1 binocular microscope, 1 microscope.

Group 141.

Municipal Improvement.

* a) 4 paintings of model plants water supplies, b) 3 paintings of model

plants for purifying waste water, c) model of a dwelling, d) Diagram of the methods of water supply in the different towns of Germany, the removal of refuse as well as figures concerning mortality and births.

Statistisches Amt der Stadt Dresden * Comparison of the attendance at the Public Baths of different towns and their water supply.

H. Brink, Armeelieferant in Wilitärfahrzeugen * Kassel * Established 1869. Conveyances, machines and arrangements for the hygienic removal of dust, street cleaning, watering, removal of mud and snow, patent hollow axles and stocks.—School room fittings, forms to lift up for the hygienic cleaning of the floor, ventilation plant for gymnasiums, &c. Complete school fittings in accordance with all hygienic requirements.

Siemens & Halske * Ozone apparatuses of different sizes for scientific and industrial purposes.—Ozone water works for reliable sterilisation of water for a central supply

In this group the municipalities of the following towns are also included in the German Hygiene Exhibition (see Exhibition of towns p. 381 and 502):

Barmen. Bautzen. Berlin. Bonn. Breslau. Bromberg. Cöin a. Rh. Dortmund. Dresden. Frankfurt a. M. Halle a. S. Kassel. Kiel. Kottbus. Leipzig. Dünchen. Strassburg 1. E. Wiesbaden. Würzburg.

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3637 3638

3638 3638a 3639

b) Exhibit of the Imperial Insurance Office and the Imperial Statistical Office in Berlin.

	Groups 129 and 135. 🔲	rance. 1. Its origin and social significance; 2. its organisation and results.	
3641	Reichs-Versicherungsamt Berlin * Ta- bular and pictorial demonstration of the	Dr. Leo, RegRat in the Kaiserl. Statisti- schen Amt * Organisation of the official	3652
:	legislative measures, management, legal terminology and statistics of German workmen's insurance. Printed matter.	workmen's statistics for Germany. Prof. Dr. Mayet, RegRat in the Kaiseri. Statistischen Amt * 1. Statistics of	365 3
3642	Kaiserl. Statistisches Amt, Berlin * Statistical works on the economical and social condition of the German	sick insurance; 2. Essays on statistical subjects, mostly agrarian.	
	nation, workmen's statistics, sick in- surance, and printed matter.	Ortskrankenkasse, Leipzig * Pictorial description of the "Augustusbad" convalescent home, and of the convales-	3654
3643	Bielefeldt, Geh. RegRat in the Imperial Insurance Office * Workmen's insurance, and national health reports.	cent homes and hospitals at Glees- berg, Förstel, and Stötteritz.	
3644	Prof. Hartmann, Geh. RegRat in the Reichs-Versicherungsamt * Protection against accidents, and inspection of	Dr. Pietsch, RegRat in the Reichs-Ver- sicherungsamt * Statistics of invali- dity insurance.	3655
3645	hygienic working conditions. Dr. Klein, RegRat in the Reichs-Versicherungsamt * 1. Statistics of work-	 "See-Berufsgenossenschaft," Hamburg Pictorial description of safety appliances on German transatlantic steamers. 	3656
3646	men's insurance; 2. Collected essays on workmen's insurance. Knappschafts-Berufsgenossenschaft,	Landes-Versicherungsamt of the country of Churingia, Weimar * Pictorial de-	3657
	Berlin * Pictorial description of the "Bergmannsheil" Hospitals at Bochum and Bergmannstrost in Halle.	scription of the invalid home at Etzel- bach in the Saale valley. "Volksheilstättenverein" of the Red	3658
3647	Danagement of the Berlin Red Cross Ambulance Society * Pictorial and statistical description of the Berlin ambulance stations.	Cross, Berlin * Pictorial and statistical description of the convalescent homes in the neighbourhood of Berlin, with plan.	
3648	Landes-Versicherungsamt of the Pro- vince of Brandenburg, Berlin * Draw- ings and descriptions of the consump-	Dr. Wolf-Becher and Dr. Rudolf Lenn- hoff of Berlin * The aims, method and results of the German convalescent	3659
	tive homes for women at Kottbus near Kolkwitz. Three framed drawings, the rest in the album.	Dr. Zacher, Geh. RegRat in the Reichso Versicherungsamt * A description of	3660
3649	Landes-Versicherungsamt of the Prc- vince of Hanover * Pictorial descrip- tion and plans of the convalescent	the system of workmen's insurance in separate pamphlets: 1. Germany; 2. Other countries.	
3650	homes at Stübeckshorn. Landes-Versicherungsamt of the Han-	Prof. Dr. Zahn, RegRat in the Kaiserl. Statistischen Amt * 1. Workmen's in-	3661
	seatic Towns, Lübeck * Pictorial de- scription with plans and drawings of the convalescent and invalid home at Gross-Hansdorf.	surance and national economy; 2. Organisation and results of the German workmen's insurance, with appendix;	
3651	Prof. Dr. Lass, RegRat in the Reichs- Versicherungsamt * Workmen's insu-	3. The protection of the German work- men; 4. Statistical essays on economical and social subjects.	
		russian Ministry for Trade	
	and In	dustry.	
	Groups 135, 13 See Mining and Metal	6, 138 and 139. lurgy p. 492 and 493.	

2. Single groups.

General progressive movements.

Exhibit of the united railway

systems of the Kingdom of Prussia and the Grand Duchy of Hesse.

See Transportation p. 473.

Group 141. Dunicipal Improvement.

Prof. Max Läuger * Karlsruhe * Artistic fountain in pottery constructed on own system for municipal parks, school gardens, &c. See grps. 14, 37 and 46 p. 401, 446—448 and 465.

Magistrat der Stadt Augsburg * a) Plan and photographs of municipal baths; b) Photograph of the shower bath at the "Jakobertor;" inaugurative address with description on the grounds. Magistrat der Stadt Barmen * a) Description of main rain-water and sewage drains (with plans); b) Section of double conduit, only arrangement of separating (drawings); c) Two portfolios with drawings of separate constructions and standards for separating system; d) Waterworks, Reservoir (drawings); e) Municipal Hydropathic and swimming baths (plans and drawings); f) "Realgymnasium" (drawings and photographs); g) National school in the Kleestrasse (drawings).

Stadtrat der Stadt Bautzen * Model of the town of Bautzen, provincial capital of the Margraviate of Oberlausitz, Saxony. 30,000 inhabitants. Exceedingly picturesque situation on the Spree, with many fine memorial buildings from the middle ages. Important industrial enterprises: Weigang Bros., largest art lithographic works in Germany (52 automatic printing presses) for cigar box covers, cigarette packings, fruit and wine labels. Exports to all parts of the world. Manufacture of fancy and coloured papers. Waggon machine works "Action-Gesellschaft vorm. Busch." Railway carriages for full and narrow gauge, tram-cars, motor cars, steam fire engines, iron foundry. United paper works. Papers for autotypy, copper plate printing, illustrations, music printing, and coloured papers for artistic printing. "König Albert" copper works (C. G.

Tietzen's son-in-law]; sheet copper, bowls, locomotive fire-boxes. Cloth factory Ltd. Co.; novelties in gentlemen's clothing, combed yarn, cheviot and knitting yarn. Mechanical weaving works Bautzen Ltd. Co.; jute spinning and weaving, packing linen and sacks for cement, sugar, &c. Stelzer works for tin enamelling and punching. Enamelled house and kitchen utensils, and medical bowls and vessels.

Magistrat der Kgl. Haupt- und Residenzstadt Berlin * a) Reliefmap of Berlin and its surroundings; b) Plan of radial-system No. 1 showing sewage system; c) Model of parts of the ir-rigation field; d) Model of a sewer--cleaning apparatus; e) Disinfecting institution (photographs and appliances); f) Water-works: model, perspective view of the water-works, at Müggelsee, Lichtenberg, Tegel, Charlottenburg, Belforter Strasse, and Tempelhofer Berg; g) Model of the "Oberbaum" bridge: h) Ten photographs of Berlin bridges; i) Fire station and registrar's office, Fischerbrücke (drawings); k) School in the Christianiastrasse (drawing, photographs and model); I) School in the Grenzstrasse (drawings, photographs, and models of the whole, of a bay, of pillar joinings, and of the chief entrance); m) School in the Wiclefstrasse (models of the façade of the school building and of the dwelling house, models in relief); n) School in the Waldemarstrasse (drawing); School in the Waldenserstrasse (drawings and model of the entrance); p) School in the Wilmsstrasse (drawings, photographs and model of the façade of the dwelling house); q) School in' the Rigaer Strasse (photographs); r) School in the Dunckerstrasse [photograph); s) Two Artizans schools Idrawings, models of the whole, and of an entrance); t) Refuge hall, Friedrichshain (photograph).

Magistrat der Stadt Bernburg * Municipal brine baths (strongest in Germany), Pump room, bridge over the Saale, and refrigerator buildings.

Magistrat der Stadt Bielefeld * Plans of the "Xl. Bürgerschule," built in 1901 at a cost of 230,000 marks. Gymnasium in the ground floor and basement; shower baths and milk kitchen

in basement.

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3668 Magistrat der Stadt Bonn * Eight synoptical plans of the historical development of the town of Bonn. Magistrat der Kgl. Haupt- und Resi-3669 denzstadt Breslau * a) Portfolio of statistical descriptions of the school system; b) Pestalozzi School (ground plan, elevation, and perspective); c) National school in the Fürstenstrasse (ground plan, section, and perspective); d) Intermediate school for boys, Teichäckern (ground plan, elevation, and perspective); e) Evangelical girls school of St. Katherine (ground plan, elevation, and wall paintings); f) Elizabeth "gymnasium" ground plan, elevation and section, and perspective); g) Description of botanical school garden; h) Description of gardening plot for National school children; i) Description and photograph of schools for cookery and housekeeping; k) municipal school--museum (diapositives); 1) Plan of organisation of the municipal night and trade schools (a book, manuscript). 3670 Magistrat der Stadt Bromberg Detailed drawings and models of the double pipes for the separating system of the present sewerage. Magistrat der Stadt Charlottenburg * 3671 Model of the public library and reading room 1:25. Comprehensive view of the art industrial and handicraft school. Plans of gas works II. Pictorial description of the gas supply system. Plan of the development of the lighting system of the town. Der Rat der Stadt Chemnitz |* Chief 3672 centre of the machine and textile industries of Saxony. Plans of the town; the market place, monuments, and School of cookery. Nursery parks. garden. Reservoirs. (Dagistrat der Stadt Cöln a.Rh. * a) Water 3673 works (plans of pumping stations and of the system of mains 1:10,000, curves of working, photographs); b) Plan of the town with description of its development and hygienic appliances, and panorama seen from the Rhine; c) Slaughter house and cattle market (plans, models of the slaughter house for hogs, refrigerator and the large abbatoirs, with description. Total cost of erection 6,017,000 marks. Largest in the Rhine province); d) Model of waggon for clearing away refuse without uncleanliness: price 1,000 to 1,200 marks: the waggon is closed in on every side with self acting openings to receive the refuse.

Grossherzoaliche Bürgermeisterei der Haupt- und Residenzstadt Darmstadt * a) Middle school in the Bessunger quarter (Façades and ground plan); b) Industrial school for boys (ground plan).

Magistrat der Stadt Dortmund * al Water colour sketch and photographic views of the restored old "Rathaus" (Stadtbaurat Kullrich, architect); b) Model of a part of the irrigation field 1 to 300, or 1 to 150; c) Gobelins in the Rathaus. (See W. Ziesch & Co., Berlin SO.

Der Rat zu Dresden * a) Architectural development of the town of Dresden (plan, nineteen sheets descriptive of the water works); b) Section of a street (two sheets); c) Expenses of street eleaning (plan); d) Knacking yard (model of the machine room, photographs of buildings, departments, and tables connected with them, &c. productions of the institution striking bolt for killing dogs); e) Time tables, pictorial descriptions, geographical home knowledge and photographic views of the workshops, holiday homes and childrens homes, of school life, &c. Description of sanitary system.

Magistrat der Stadt Dulsburg * Kaiserberg with gardens and play-grounds. Drawings and photographs. Extensive gardens in which 12,000 children are collected on national patriotic holidays to play, and are fed.

Magistrat der Stadt Düsseldorf * Interior of the lecture hall of a higher school for boys. Plan of the town and drawings descriptive of the drainage. Sewage farms. Improvements of the wharfage on the Rhine.

Magistrat [der Stadt] [Elberfeld] Description of several new buildings for national and higher schools. Wall paintings by Professor Spatz of the "Real-Gymnasium." Photographs of the suspended railway between Elberfeld and Barmen.

Magistrat der Stadt Frankfurt a. M. * Drawings of the Frankfort water works system; b) of the Frankfort filtration works; c) Plan of the breaches in the old town; d) Laying out plan of the "Kiesheide" district; e) Drawings of school buildings in Frankfort; f] Water colour, the town hall, Frankfort; g) Album of photographs of the Frankfort rublish carts.

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DOWN AND AND AND AND AND AND AND AND AND AN	working and good results. (Silver medal, Paris 1900.) b) School house specially constructed for the instruction of mentally abnormal children ("Hilfsschule.")	Magistrat der Stadt Metz. Magistrat der Kgl. Haupt- und Residenzstadt München * Karl Müller's Peoples Bath (endowed) perspective and turning stands with fifteen tables. b) Plan of	369 369
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	(model of the system of purifying from iron, drawing and photograph of the	e) Statistical material. Stadtmagistrat Nürnberg * a) School house in the Rismarckstrasse (pen and	369

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Magistrat der Stadt Plauen 1. V. *
1. Plauen. Road viaduct over the Syratal.
Solid arch of ninety metres span.
Erected at a cost of 500,000 marks.
2. Town-park, Plauen.

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MagIstrat der Stadt Strassburg I. E.

* a) Four tables: carvings and decorative smith work. b) Three tables:
modelling and turned work. c) Five tables: cabinet-makers' and turners' work, and flat carving. d) Knitting frames. e) Three tables of drawings and two of photographs.

Stadtschulthelssenamt Stuttgart * 1. Relief of the town of Stuttgart and environs, with projected extensions. Condition in 1903. 2. Stuttgart, municipal workmens' dwelling houses, comprehensive pictures with ground plans, showing peculiarities. Unique group of buildings with one, two, and three roomed flats. Cost of erection 450,000 marks. 3. School buildings, Stuttgart, comprehensive views with ground plans. a) "Wilhelmsrealschule;" combination of school, gymnasium, and school courts expedient under difficult conditions of ground; gas heating. b) "Ostheimer"

School, national school; central corridor with conveniences for clothing. Gas heating; school baths; picturesque situation. c) "Schwab" school, National school; side corridor with extensions for clothing; gas heating; school baths.

MagIstrat der Stadt Wiesbaden *
a) Photographs of bath houses (baths of the High School for girls, baths in the Roonstrasse, of the Gutenbergschule, Blücherschule, in the Kirchhofsgasse, and the Kurhaus. c) Theatre foyer (photographs and models). d) Models (dispensary of the Kurhaus, the Nerotal, the Dambachtal, fish farm, and the Salzbach canal). e) Description of the working of the canal. f) Description of the cleaning of the sediment basin.

Magistrat der Stadt Worms |* Workmen's dwelling houses, Worms, of the commonwealth building society, erected by municipal aid since 1897. One storied building with overhanging attics, garden plot. Drawings.

Stadtmagistrat Würzburg * 1. Two plans of the development of the capital and university town of Würzburg (Bavaria). 75,496 inhabitants, 3,216 hectares area. 2. Two maps with graphic description of the vineyard areas, their productiveness, the sale prices of the wines of the "Bürgerspital" from 1876 to 1901. 3. Ground division map of Würzburg showing a) the wine producing surface, and b) the vineyard property of the municipally managed charitable establishment, the "Hospice (Bürgerspital) of the Holy Ghost."

See advertisements p. 8.

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German-Tyrolese Alps. Designer: Hermann Knauer * Berlin W., Viktoria-Luise-Platz 9. Execution: Boswau & Knauer, G. m. b. H. * Berlin W., Viktoria-Luise-Platz 9. The arrangement follows an original system which has already taken prizes at the following exhibitions among others: Industrial Exhibition at Berlin in 1896, Thuringian exhibition of trades and industries of 1897, German Building Exhibition at Dresden in 1900, L'exposition universelle de Paris 1900, International exhibition of fire brigade and rescue at Berlin in 1901, and the trades, industrial and art exhibition at Düsseldorf in 1902. The ascents, foregrounds, panoramas, &c., are also arranged on original systems. by the Landesverband für Fremden-The following artists, business houses verkehr in Tirol and which have been and exhibitors have contributed to the exhibit: sent in by the following artists or Prof. Jos. Rummelspacher * Berlin * exhibitors. Panoramas, Dioramas and landscapes. See grp. 37 p. 457. Franzvon Defregger * München * 1."Episode in the defence of the Tyrol in the war of independence (1809)." 2. "A call Schaeffer & Walcker * Berlin * Fairy to arms (1809)." 3. "Speckbacher and his son (1809)." 4. "The landlord of Tharer (1809)." 5. "Pilgrim in the Tyrol." fountain and enchanted grotto. Emil Gobbers * Düsseldorf * Representation of the original "Passion play" See p. 390. of Oberammergau by means of elec-Mathlas Schmld * München * 1. "The robbers of the air." 2. "The letter cartrically projected paintings. Deutsche Automatengesellschaft Stollrier." 3. "Before the feast." 4. "A lonely height." See p. 394. werck & Co. * Cöln on Rh. * Automatic orchestra and automatic machines. See p. 416. Frau Rose Schmld-Görlnger * "Portrait Stange & Wagner * Berlin * Placards of herself." and postcards. J.Wopfner * 1." To the rescue." 2. "Landscape study on the Isar." 3." On the Chiem-There is also in the German-Tyrolese see." 4. "Excursion near Ober-Bozen." Alps a separate exhibition of paintings

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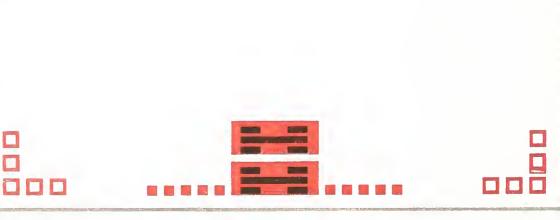


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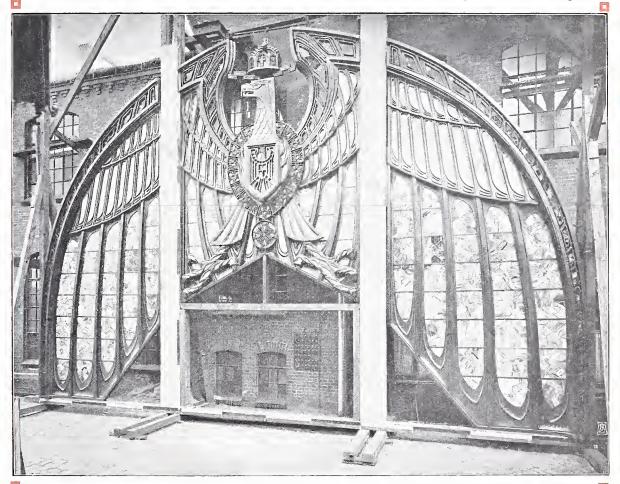
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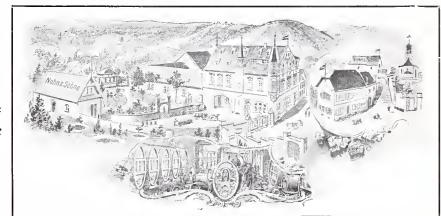
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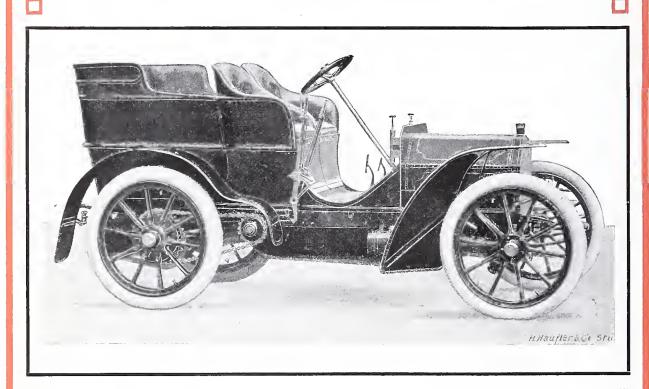
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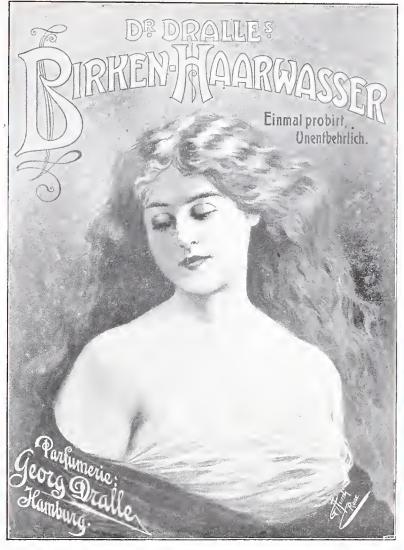
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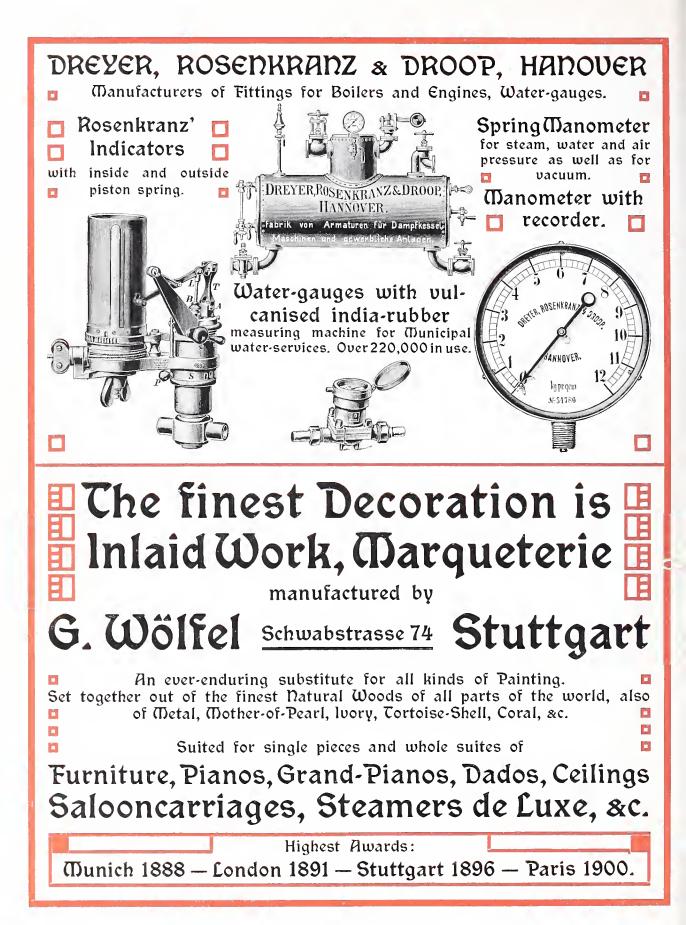


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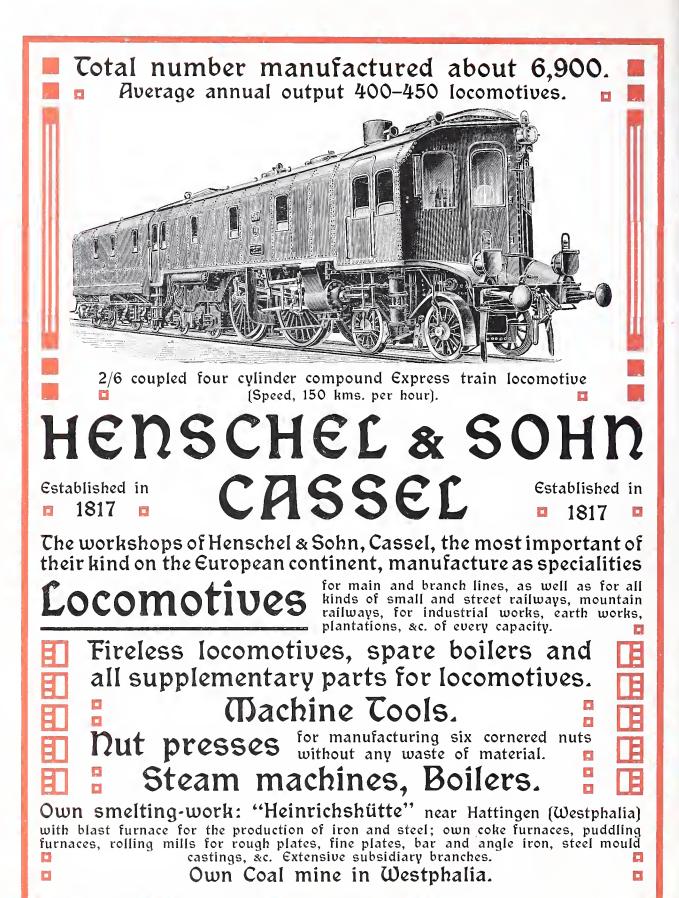
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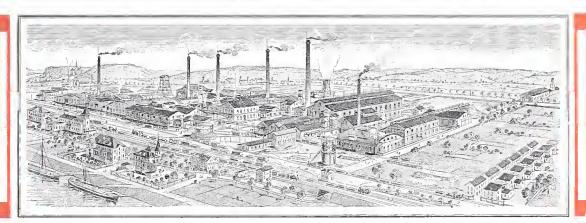
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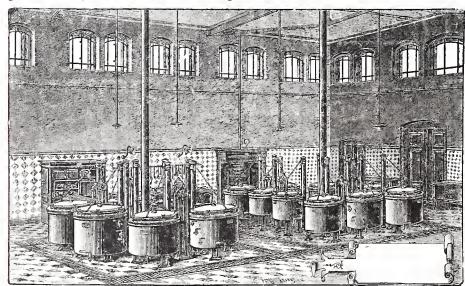
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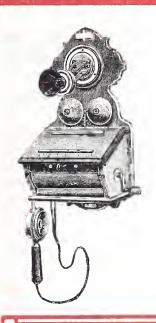
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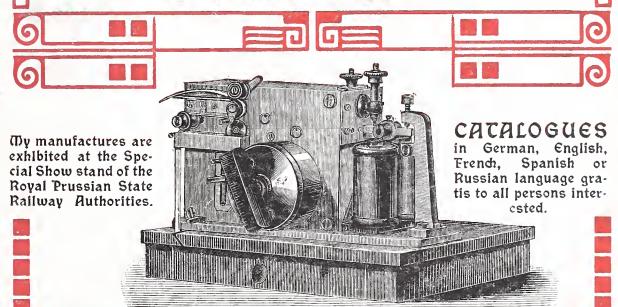
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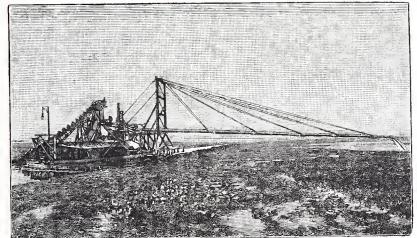
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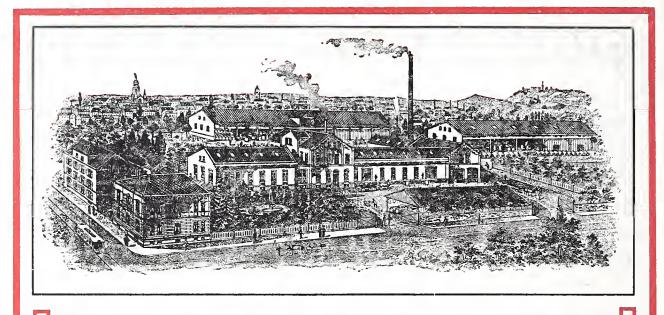
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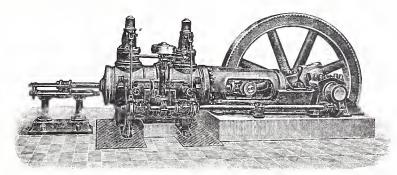
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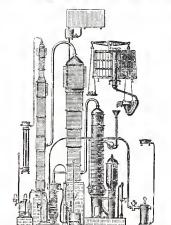
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References:

Works executed for Prof. Bruno Schmitz, Prof. Karl Hoffacker (Art Institution Berlin, &c.), Works Commissioners Kayser and von Grossheim, Kieschke, Schulze, &c.





